THOMPSON'S
TEACHER'S
EXAMINER

THE UNIVERSITY
OF ILLINOIS
LIBRARY

371.27
T37t
1882

The person charging this material is responsible for its return to the library from which it was withdrawn on or before the **Latest Date** stamped below.

Theft, mutilation, and underlining of books are reasons for disciplinary action and may result in dismissal from the University.

To renew call Telephone Center, 333-8400

UNIVERSITY OF ILLINOIS LIBRARY AT URBANA-CHAMPAIGN

FEB 14 1984
NOV 04 1983
MAY 2 1984
JUL 3 0 1984

L161—O-1096

THE

Teacher's Examiner,

GIVING A GENERAL REVIEW OF THE

COMMON AND HIGH SCHOOL STUDIES,

IN A

SERIES OF QUESTIONS AND ANSWERS.

For Teachers, and Those Preparing Themselves to Teach.

ALSO

To Assist in Fitting the Student for Higher Grades of Study.

BY

ALBERT H. THOMPSON,

CHICAGO, ILL.

REVISED AND ENLARGED.

CHICAGO, ILL.,

1882.

Entered according to Act of Congress, in the year 1878,
BY
ALBERT H. THOMPSON,
In the Office of the Librarian of Congress, at Washington.

371.27
T37t
1882

1875840 MLS

PREFACE.

In presenting this book to teachers and students, the author is not unmindful of the fact that there are other similar publications, but, after a solicitous perusal on the results of his labor, fully believes the work is such as to cover the ground of all of them.

The desire has been to present to the investigator some of the most important and essential principles of the Common and High School studies, and to present them in such manner as to enliven and elevate the mind; the motive being to facilitate the excellence of examinations, and to cultivate an ever-growing love for the knowledge which tends to exalt and bring the mind to a higher and more useful sphere.

It will be observed that the answers and solutions which are here presented are somewhat brief, but considerable attention has been given to make them as concise as possible, that the student may lay up in store as much information as if he had perused a volume with double the amount of reading.

Hoping that the above features, besides others which need not here be enumerated, will recommend this work to the great body of teachers and students, who are ever ready to welcome a progressive and instructive book, the author remains,

Very truly yours,

A. H. THOMPSON.

1047037

Digitized by the Internet Archive
in 2017 with funding from
University of Illinois Urbana-Champaign Alternates

https://archive.org/details/teachersexaminer00thom

HISTORY.

QUESTIONS.

1. What is History?

2. Into how many periods is the history of the United States divided?

3. What records show that America was discovered previous to the discovery of Columbus?

4. What proofs have we to show that America was inhabited by a race of men previous to the Indians?

5. When and by whom was America discovered?

6. What land did Columbus first discover, and when?

7. Who discovered the continent before Columbus, and where?

8. Why was this continent named America, instead of Columbia?

9. What nations explored the future United States?

10. Where were the claims of the Spaniards made?

11. When and where was the first colony founded on the American continent?

12. When and by whom was the Pacific Ocean discovered?

13. When and by whom was Florida discovered?

14. Who was the first circumnavigator of the globe?

15. Who was Ferdinand DeSoto?

16. Which is the oldest city in the United States? When and by whom was it founded? The second?

17. Where did the French make their claims?

18. When and by whom was the gulf and river of St. Lawrence named?

19. What region of country was called Acadia?

20. When and by whom was Lakes Champlain and Huron discovered?

21. Where did the English make their claims?

22. Who was Francis Drake?

23. When and by whom was the first British attempt at American colonization?

24. Where was the attempted settlement made, and was it successful?

25. What became of Gilbert?

26. Who next attempted to form English settlements in America?

27. What territory was granted the London Company?

28. What territory was granted the Plymouth Company?

29. When and where was the first permanent English settlement in the United States?

30. Who sent out the settlers to Jamestown?

31. Where did the Dutch make their claims?

32. Who were the first Spanish, French, English, and Dutch discoverers?

33. Who was Henry Hudson?

34. Where and when was the first permanent settlement made by the Dutch?

35. Where and when was the first permanent settlement made by the French?

36. Who was Captain John Smith?

37. What was the "House of Burgesses?"

38. When and where was the first representative assembly ever convened in America?

39. When and by what nation was negro slavery introduced into the United States?

40. When was the first Indian plot to massacre the English?

41. When was the first massacre?

42. When was the second massacre?

43. What were the Navigation Acts?

44. When and what was the cause of "Bacon's Rebellion?"

45. Who was Nathaniel Bacon?

46. When was the College of William and Mary founded?

47. Who were the Pilgrim Fathers?

48. When and by whom was the first colony founded in Massachusetts?

49. Who was Roger Williams?

50. What was the Salem Witchcraft?

51. Who was King Philip? When and what was the cause of his war?

52. What became of King Philip?

53. When and where was Yale College founded?

54. When and where was Brown University founded?

55. When and where was Harvard College founded?

56. What was the cause of the Pequot War? How did it terminate?

57. What name did the Dutch give their colony on Manhattan Island?

58. How was this island procured?

59. What was the cause of Clayborne's Rebellion?

60. When did King William's War occur, and how long did it last?

61. What ended King William's War?

62. When did Queen Anne's war occur, and how long did it last?

63. What ended Queen Anne's War?

64. When and by whom was the first newspaper printed in America?

65. Where and when was the first printing press set up in America.

66. Who was Jonathan Edwards?

67. When did King George's War occur, and how long did it last?

68. What ended King George's War?

69. When did the French and Indian War occur, and how long did it last?

70. What was the cause of the French and Indian War?

71. Where was the disputed territory?

72. Where and when was the first permanent settlement made in the Mississippi River Valley?

73. Who was John Eliot?

74. Who was William Kidd?

75. Who was sent to request the French to withdraw from the territory on the Ohio?

76. What was the result of Washington's endeavor to compel the French to abandon the Ohio?

77. After Washington's retreat, what General was sent in his place against the French?

78. What was the result of General Braddock's expedition?

79. What was the result of the attack upon Fort DuQuesne?

80. What was the principal object of the campaign of 1759?

81. What was the success of the English at Crown Point and Ticonderoga?

82. Give a description of the attack on Ticonderoga?

83. When and by whom was Fort Niagara captured?

84. Who were the commanders at the battle of Quebec?

85. Describe the attack on Quebec.

86. What Generals were killed at the capture of Quebec, and what were their dying words?

87. What ended the French and Indian war?

88. What was the treaty of peace between France and England?

89. What were the anticipations of the American people at the close of the war?

90. What was the cause and result of Pontiac's War?

91. What were some of the causes which led to the American Revolution?

92. What was the Stamp Act, and when passed?

93. What individual distinguished himself regarding the Stamp Act?

94. What was the business of the "Sons of Liberty?"

95. What was the decision given by the Assembly of Pennsylvania in regard to the Stamp Act?

96. Where and when did the first Colonial Congress meet?

97. When was the Stamp Act repealed?

98. What two great men in Parliament were advocates of the repeal?

99. What was the Mutiny Act, and when was it?

100. What was the Boston Port Bill?

101. When was the Boston Massacre?

102. What happened in Boston in relation to the tea tax?

103. Where and when did the first Continental Congress assemble? What action did it take?

THE REVOLUTIONARY WAR.

104. What General had command of the British troops at the beginning of the Revolution?

105. Where and when was the first battle of the Revolution fought?

106. Where and when was the battle of Bunker Hill fought?

107. Who were the commanders at the battle of Bunker Hill? How many were engaged on each side, and what was the loss?

108. What did Allen say, when asked by what authority he demanded the surrender of Ticonderoga?

109. Where and when did the second Continental Congress assemble? What did this Congress do?

110. What was the Mecklenburg Declaration?

111. Describe the American attack on Quebec.

1776.

112. What is the year 1776 memorable for?

113. What resolution did Richard Henry Lee, of Virginia, present to Congress?

114. Who wrote the Declaration of Independence?

115. When was the Declaration of Independence adopted by Congress?

116. When was the attack on Fort Sullivan, and what was the result?

117. Who were the commanders at the battle of Fort Sullivan?

118. Who was Sergeant Jasper?

119. When was the battle of Long Island?

120. Who commanded at the battle of Long Island, and what was the loss?

121. In the retreat of Washington, what places did he pass?

122. What valiant exploit was made by Washington near the close of the year 1776?

123. Why did Washington choose Christmas night to attack the Hessians?

124. When and by whom was Rhode Island captured?

1777.

125. At the opening of the year 1777, how many British armies were in America?

126. When was the battle of Princeton? Which side was victorious?

127. What brave General fell in the battle of Princeton?

128. What brave exploit was performed by William Barton, July 10th, 1777?

129. When was the battle of Chad's Ford, and which side was successful?

130. Who was Lydia Darrach?

131. Who was the Marquis de La Fayette?

132. When was the battle of Germantown, and which side was defeated?

133. Where did each army go into winter quarters in the fall of 1777?

134. When and by whom was Fort Ticonderoga captured?

135. When was the battle of Bennington, and what was the number lost?

136. Where, when, and to whom did General Burgoyne surrender?

137. What plot was hatched in Congress to put Washington out of command of the army.

138. When did Congress adopt the Articles of Confederation?

139. Where and when was the battle of Stillwater fought?

140. Who were the commanders at the battle of Stillwater?

1778.

141. Who was Silas Deane?

142. What treaty was made between France and America in 1778?

143. What did England do on finding that the colonists had obtained the aid of so powerful an ally?

144. Whom did one of the commissioners attempt to bribe, and what was the reply?

145. Where and when was fought the battle of Monmouth?

146. Who was Major Molly?

147. What assistance was sent by France to America?

148. When was the massacre of Wyoming, and who directed it?

1779.

149. Who had command of the American forces in the south in 1779, and who of the British?

150. Who was General Putnam?

151. When was the capture of Stony Point? Who commanded?

152. What had previously been done to assist General Wayne in making the attack on Stony Point?

153. What other British garrison was surprised about this time?

154. By whom, and with what success?

155. Where was General Sullivan ordered, and for what purpose?

156. When was the battle of Savannah fought?

157. Who were the commanders at the battle of Savannah?

158. Who were some of the valuable officers and men left among the dead at the battle of Savannah?

159. Who was Paul Jones?

160. What was the feeling at the close of 1779? What is said of the finances and continental money?

1780.

161. Describe the siege of Charleston.

162. Who remained in command of the British forces, and who succeeded General Lincoln?

163. When was the battle of Camden, and which side was victorious?

164. What cheered the Americans?

165. Who was Nathaniel Greene?

166. Who was Benedict Arnold?

167. What had hitherto been the character of Arnold?

168. Who was Major Andre?

169. What befell Andre on his journey towards New York?

170. What day was set to deliver West Point into the hands of the British?

171. What were the words of General Washington when the proofs of Arnold's treason were placed in his hands?

172. What became of Andre? Also of Arnold?

173. Describe the position of the British armies at the close of 1780.

1781—1788.

174. When was the battle of the Cowpens? Who were the commanders, and what was the loss?

175. When was the battle of Guilford Court House, and who commanded?

176. When was the battle of Eutaw Springs?

177. Was General Green ever known to have gained any important victory?

178. When and to whom did Lord Cornwallis surrender?

179. Who were appointed commissioners for the United States to conclude a treaty of peace with Great Britain?

180. When was the final treaty of peace signed, and where did they meet?

181. What did this treaty acknowledge? What is said of the boundaries of the United States?

182. What kind of government had the United States at this time?

183. What was the cause of Shay's Rebellion?

184. When was the Constitution adopted?

185. How many parties were the people divided into at this time?

WASHINGTON'S ADMINISTRATION.

186. When and where was Washington inaugurated as President of the United States?

187. Who were Washington's first Cabinet?

188. When was the Constitution completely ratified?

189. When and where was the United States Bank established?

190. Who was appointed Minister to the United States from France?

191. What great calamity visited the American people in August, 1793?

192. What was the Whiskey Insurrection?

193. What treaty was made with Spain in regard to the boundary line?

194. When was the French Revolution, and what countries were involved?

ADAMS'S ADMINISTRATION.

195. When was John Adams inaugurated?

196. The election of Adams was a triumph of what party?

197. What cause threatened a war with France?

198. To this unworthy suggestion, who made a reply?

199. Who came to the head of French affairs? What did he do?

200. In the midst of these events, what memorable event happened?

201. When was the seat of government removed from Philadelphia to Washington?

JEFFERSON'S ADMINISTRATION.

202. When was Thomas Jefferson inaugurated?

203. The election of Jefferson was a triumph of what party?

204. What were the Alien and Sedition Laws? When were they?

205. What very important event happened during Jefferson's administration?

206. What region did the Louisiana purchase include?

207. What was the cause of the war with Tripoli? When was it?

208. What duel was fought at this time? Tell about it.

209. Give an account of the supposed plot of Aaron Burr.

210. What was called the Right of Search?

211. What was the Milan Decree?

MADISON'S ADMINISTRATION.

212. When was James Madison inaugurated?

213. The election of Madison was a triumph of what party?

214. What was the Non-Intercourse Act?

215. Describe the battle of Tippecanoe.

216. What was the chief event of Madison's administration?

WAR OF 1812.

217. What was the cause of the war of 1812?

218. What were the movements of General Hull? What was the result?

219. Describe the action at Queenstown Heights.

220. What were some of the naval victories of the Americans in 1812?

221. What number of prizes were taken during this year?

1813.

222. Into what three armies were the American forces divided in 1813?

223. What was the object of the Army of the West? Give an account of the movement on Frenchtown.

224. What Union commander commanded at Fort Meigs?

225. When was the battle of Lake Erie?

226. Describe the battle of Lake Erie.

227. Give an account of the action on the Thames.

228. Give an account of the outbreak of the Seminole War.

229. Who was the leader of the whites?

230. Give an account of the fights. State the result.

231. What were some of the American naval victories during this year?

232. When and where was Captain Lawrence killed? What were his last words?

233. Describe the encounter of the Essex.

1814.

234. How many campaigns were there in 1814?

235. When was the battle of Lundy's Lane? Who commanded?

236. Describe the battle of Lake Champlain.

237. When was the Capitol at Washington burned? Who commanded the British troops?

238. What was the Hartford Convention?

239. When and where was a treaty of peace made?

240. How long had the war lasted?

1815.

241. Describe the battle of New Orleans.

242. What was the national debt at the close of the War?

243. During the war, what *right* did the American navy forever settle?

MONROE'S ADMINISTRATION.

244. When was James Monroe inaugurated?

245. Was the election of Monroe a triumph of either party?

246. What was the "Missouri Compromise?" Who proposed it?

247. What was the "Monroe Doctrine?"

248. What foreigner visited this country as "The Nation's Guest?"

J. Q. ADAMS'S ADMINISTRATION.

249. When was J. Q. Adams inaugurated?

250. The election of J. Q. Adams was a triumph of what party?

251. When and by whom was the corner-stone of Bunker Hill Monument laid?

252. What two patriots died on the 4th of July, 1826?

253. What was the "American system?"

254. When and where was the first railroad built?

255. When was the first *real* railroad built?

JACKSON'S ADMINISTRATION.

256. When was Jackson inaugurated?

257. The election of Jackson was a triumph of what party?

258. When was the Black Hawk War?

259. What was the "Nullification Ordinance?"

260. Who was the strongest supporter of nullification?

261. When was the Florida War, and how long did it last?

VAN BUREN'S ADMINISTRATION.

262. When was Van Buren inaugurated?

263. The election of Van Buren was a triumph of what party?

264. What memorable event happened during Van Buren's administration?

265. When was the Canadian Rebellion?

266. When and what was the Sub-Treasury Bill?

HARRISON AND TYLER'S ADMINISTRATION.

267. When was Harrison inaugurated?

268. The election of Harrison was a triumph of what party?

269. How long did Harrison remain in office?

270. What bill was vetoed by Tyler, to the great disgust of the men who elected him?

271. When was the boundary line of Maine settled between the United States and Great Britain?

272. What was the cause of the Dorr Rebellion?

273. What were the Anti-Rent difficulties?

274. Where and when was the first telegraph, and what was the first message sent by it?

275. When and by whom was the cotton-gin invented?

JAMES K. POLK'S ADMINISTRATION.

276. When was Polk inaugurated?

277. The election of Polk was a triumph of what party?

278. What was the most important fact of Polk's administration?

279. When was the battle of Palo Alto, who were the commanders, and what was their number of troops?

280. When was the surrender of Monterey?

281. When was the battle of Buena Vista, who were the commanders, and which side was victorious?

282. Who was John C. Fremont?

283. When and to whom did the Mexicans surrender Vera Cruz?

284. When and to whom did the City of Mexico surrender? What was the number of troops?

285. What treaty formally ended the Mexican War? When was peace proclaimed?

286. State the territory ceded by this treaty to the United States.

TAYLOR'S AND FILLMORE'S ADMINISTRATIONS.

287. When was Taylor inaugurated?

288. The election of Taylor was a triumph of what party?

289. What important question arose at the commencement of Taylor's administration?

290. What bill did Henry Clay propose?

291. What was the Fugitive Slave Law?

292. When did President Taylor die?

293. What two great men died in 1852.

PIERCE'S ADMINISTRATION.

294. When was Pierce inaugurated?

295. The election of Pierce was a triumph of what party?

296. What was the Gadsden purchase?

297. What was the Kansas-Nebraska Bill? And by whom presented?

BUCHANAN'S ADMINISTRATION.

298. When was Buchanan inaugurated?

299. The election of Buchanan was a triumph of what party?

300. What was the Dred Scott decision?

301. What was the John Brown raid?

302. In the fall elections, who were the candidates for the Presidency? What were their "platforms?"

303. What was the cause which led to the Civil War?

304. What state headed the secession movement?

305. What states imitated South Carolina?

306. When and where was the Southern government organized?

307. Who were chosen President and Vice-President?

LINCOLN'S ADMINISTRATION—1861.

308. When was Lincoln inaugurated?

309. When and to whom did Fort Sumter surrender?

310. How many troops were called for?

311. Where and when was the first blood shed in the war?

312. Who was Elmer E. Ellsworth?

313. When was the battle of Philippi?

314. When was the battle of Rich Mountain? Who were the commanders?

315. When was fought the battle of Bull Run, and who were the commanders?

316. What call at this time was made for troops?

317. When was fought the battle of Ball's Bluff, and with what result?

318. When was fought the battle of Wilson's Creek? Who were the commanders, and how many engaged on each side?

319. What brave commander was killed at the battle of Wilson's Creek?

320. When and where was the battle of Belmont fought?

321. When did General Scott retire from active service?

322. What *proclamation* was issued by the British government soon after the outbreak of hostilities?

323. What event nearly produced war with England?

324. Give an account of the seizure of Mason and Slidell.

325. Describe the effect on the British government.

326. How was war avoided?

327. Why did the United States government give them up?

1862.

328. Describe the situation of the Confederate forces at the commencement of 1862.

329. Describe the situation of the Union forces.

330. Who was in chief command of the Southern forces at this time?

331. Who was in chief command of the Union forces?

332. When was fought the battle of Mill Spring, and who commanded the forces?

333. In the engagement at Mill Spring, which side was victorious? What rebel commander was killed?

334. When and to whom was Fort Donelson surrendered?

335. When and to whom was Nashville surrendered?

336. When and to whom was Island No. 10 surrendered?

337. When was fought the battle of Shiloh, or Pittsburg Landing, and who commanded?

338. What was the strength of the two armies at the battle of Shiloh? Which side was victorious?

339. What was the loss of each army in the battle of Shiloh?

340. When was fought the battle of Perryville, and who were the commanders?

341. When was fought the battle of Murfreesboro, or Stone River, and who were the commanders?

342. In the battle of Murfreesboro, what were the number engaged, and what was the loss?

343. Which side was victorious in this battle?

344. When was fought the battle of Pea Ridge and who were the commanders?

345. When and to whom was New Orleans surrendered?

346. Who was John Morgan?

347. When was the battle of Richmond fought, and which side was victorious?

348. Give an account of the Merrimac.

349. Describe the attack of the Merrimac upon the Union fleet in Hampton Roads.

350. What vessel came to the rescue of the Federal fleet?

351. Describe the appearance of the Monitor.

352. When was the fight between the Merrimac and Monitor? Describe it.

353. Describe the defeat experienced by General Banks's division.

354. When was fought the battle of Fair Oaks, and who were the commanders?

355. When was fought the battle of Cedar Mountain, and who were the commanders?

356. When was the second battle of Bull Run fought?

357. When and to whom was Harper's Ferry surrendered?

358. When was the battle of Chantilly fought? What two Union Generals were killed at this battle?

359. Describe the battle of Antietam.

360. When was fought the battle of Fredericksburg, and which side was victorious?

1863.

361. When and by whom was the Emancipation Proclamation issued?

362. When was the battle of Chancellorsville fought, and who were the commanders?

363. What rebel General was killed in this battle?

364. When was the battle of Gettysburg fought, and which side was victorious?

365. Who were the commanders at the battle of Gettysburg?

366. What did Lee do after the battle of Gettysburg?

367. When and to whom was Vicksburg surrendered?

368. How long did the siege of Vicksburg last?

369. When and to whom was Port Hudson surrendered?

370. When was the battle of Chickamauga fought, and who were the commanders?

371. Which army was beaten in the battle of Chickamauga?

372. When was the battle of Lookout Mountain fought, and who were the commanders?

373. Describe the battle of Missionary Ridge.

374. When was the battle of Knoxville fought, and who were the commanders?

375. What was the Draft Riot?

376. What possessions had the Union forces at the close of 1863?

1864.

377. Describe the raid made by General Kilpatrick at the beginning of 1864.

378. What was accomplished by this expedition?

379. What befell Colonel Dahlgren and his command?

380. When was General Grant appointed Lieutenant-General of all the Union forces?

381. When was the battle of the Wilderness fought? Who commanded?

382. What memorable words were written by General Grant to the President, on the 11th of May, 1864?

383. After the battle of the Wilderness, what did both armies do?

384. What did the Federals now do?

385. Where was the enemy posted at this time?

386. How long did the siege of Petersburg and Richmond last?

387. Give an account of the *mine affair*.

388. Where did Lee send General Early's column?

389. Give an account of Early's movement into Maryland.

390. When was the battle of Winchester, and who were the commanders?

391. Describe the battle at Cedar Creek.

392. What were some of the outrages committed by the rebels at Chambersburg, in 1864?

393. When was the battle of Resaca fought, and who were the commanders?

394. What happened while Sherman was preparing to attack Atlanta?

395. When was the battle of Franklin?

396. Give an account of the battle before Nashville.

397. Describe Sherman's march to the sea.

398. Describe the Red River Expedition.

399. Describe the massacre at Fort Pillow.

400. What occurred at St. Albans, Vermont, on the 19th of October, 1864?

401. Describe the attempt made by rebel emissaries to fire New York.

402. What was the Alabama? What injury did she do?

403. Describe the encounter between the Kearsarge and the Alabama.

404. What other interesting naval operation occurred during this year?

405. How high did gold rise in 1864?

1865.

406. What opened the campaign of the year 1865?

407. When and to whom was Columbia, South Carolina, surrendered?

408. Give an account of Sheridan's movements in Virginia.

409. What assault did the rebel General Lee plan?

410. When was the battle of Five Forks, and which side was victorious?

411. When did Lee evacuate Richmond and Petersburg?

412. In what direction did Lee retreat?

413. When and to whom did Johnston and Lee surrender?

414. What terrible event happened shortly after Lee's surrender?

415. Give an account of the attack on Secretary Seward?

416. How long did the war last?

417. When was Jefferson Davis captured, and what was done with him?

418. What was the total number of troops called for? The total number obtained?

419. What was the cost of the war?

420. In the late Rebellion how many men were lost?

421. After the death of President Lincoln, who then became President? When was he inaugurated?

422. What proclamation was issued by President Johnson?

423. What caused trouble between President Johnson and Congress?

424. Mention the names of some of the bills passed by Congress.

425. State what you can in relation to each bill.

426. What charges were brought against President Johnson?

427. When was Alaska purchased by the United States, and what was the sum paid?

428. At the close of the war, what demand was made of Napoleon by Secretary Seward?

429. When was President Grant inaugurated?

430. President Grant was in harmony with what party?

431. What proclamation did Grant proclaim?

432. When was the Atlantic Cable completed? Tell about it.

433. Give an account of the first steamboat.

434. When was the Union Pacific Railroad completed?

435. What was the difficulty with England, and how was it settled?

436. Mention some of the American historians.

437. Mention some of the poets.

438. Mention some of the romance and miscellaneous writers.

439. Mention some of the orators.

440. Can you state any good effect arising from the late war?

441. Give an account of Santo Domingo, and its application to be annexed to the United States.

442. Describe the important conflagrations of 1871–2.

443. What Indian war arose in 1865–6?

444. Give an account of the Fenian excitement in 1866.

445. Give an account of the treaty with China in 1868.

446. Tell about the Modoc Indians.

447. What was the Credit Mobilier?

448. Describe the Railroad Panic of 1873.

449. Tell what you can in regard to the Virginius.

450. What political difficulties occurred in the Southern States during Grant's administration?

451. Were any acts of perpetration committed?

452. What difficulties arose in Louisiana over the election in the fall of 1876?

453. In what other Southern State did a similar conflict ensue?

454. What paralyzed the industries of the nation?

455. Had any measures been proposed for the removal of the financial difficulties which overhung the land?

456. What noted public men were called to their rest during Grant's administration?

457. What great celebration marked the Centennial year of 1876?

458. Give an account of the Indian depredations during this year.

459. State what you can in regard to the Presidential election of 1876.

460. Describe the result of the election.

461. The summer of 1877 was memorable for what?

462. In what manner did the railroad strike terminate?

463. What can you say of the 46th Congress, which met Dec. 6, 1880?

464. What bill was vetoed by President Hayes, March 3, 1881?

465. When was Garfield inaugurated?

466. In Garfield's address, what did he strongly urge?

467. Can you mention Garfield's Cabinet, as confirmed March 5, 1881?

468. What nomination was made by Garfield March 23, 1881?

469. When did Secretary Windom begin his refunding operations?

470. What nominations did Garfield withdraw from the Senate?

471. What resignation occurred in the Senate May 16, 1881?

472. What treaties were confirmed by the Senate in 1881?

473. What discussion arose over the Senate offices in 1881?

474. What lamentable event happened on July 2, 1881?

475. When and where did the death of President Garfield occur?

476. What fires occurred in Michigan in 1881?

477. Who became President after Garfield's death?

478. When was Arthur formally sworn into office?

479. When and where was the funeral of President Garfield held?

480. After Arthur became President, who was elected President of the Senate?

481. Who was elected President of the Senate *pro tem* ?

482. What can you say of the trial of Guiteau?

483. Mention some of the notable events which occurred during the years 1880 and 1881.

484. When was Vermont admitted into the Union?

485. When was Kentucky admitted into the Union?

486. When was Tennessee admitted into the Union?

487. When was Ohio admitted into the Union?

488. When was Louisiana admitted into the Union?

489. When was Indiana admitted into the Union?

490. When was Mississippi admitted into the Union?

491. When was Illinois admitted into the Union?

492. When was Alabama Admitted into the Union?

493. When was Maine admitted into the Union?

494. When was Missouri admitted into the Union?

495. When was Arkansas admitted into the Union?

496. When was Michigan admitted into the Union?

497. When was Florida admitted into the Union?

498. When was Texas admitted into the Union?

499. When was Iowa admitted into the Union?

500. When was Wisconsin admitted into the Union?

501. When was California admitted into the Union?

502. When was Minnesota admitted into the Union?

503. When was Oregon admitted into the Union?

504. When was Kansas admitted into the Union?

505. When was West Virginia admitted into the Union?

506. When was Nevada admitted into the Union?

507. When was Nebraska admitted into the Union?

508. When was Colorado admitted into the Union?

HISTORY.

ANSWERS.

1. History is a narration of events regarding nations and countries.

2. Into four periods: (*a.*) The Period of Discovery and Exploration, extending from the discovery of America by Columbus, A. D. 1492, to the establishment of the early English Colonies, 1607–20.

(*b.*) The Colonial Period, from the date of the early colonial settlements to the breaking out of the American Revolution, 1775.

(*c.*) The Revolutionary Period, from the breaking out of the Revolution, through the seven years' war, and the era of the Confederation, to the organization of the government under the Federal Constitution, 1789.

(*d.*) The Constitutional Period, from the organization of the government under the Constitution to the present time.

3. The historical records of Iceland show that America was discovered by the Northmen in 1002.

4. In Central America and Mexico there are ruins of ancient cities, and the Indians have no tradition as to their

origin. A large number of curiously constructed earth mounds are scattered through the Mississippi River Valley, and from the gulf to the lakes, which are evidences of a different race of men that inhabited the continent previous to the Indians.

5. America was discovered by Christopher Columbus, in the year 1492.

6. The Island of San Salvador, or Guanahani, one of the Bahamas, on Friday, October 12th, 1492.

7. John Cabot and his son, Sebastian, who discovered Prima Vista, or Cape Breton, in 1494.

8. A German geographer published a book, and not knowing that Columbus had before this reached the very same coast that was claimed by Americus Vespucius, it was named America, in honor of him.

9. The Spaniards, French, English, and Dutch.

10. In the West Indies, and southern part of the United States.

11. On the Isthmus of Darien, by the Spaniards, in 1510.

12. In 1513, by Vasco de Balboa.

13. In 1512, by Ponce de Leon, who was searching for a fabled fountain of immortal youth.

14. Magellan, who left Spain in 1519, sailed around South America, across the Pacific Ocean to Spain. The voyage took over three years.

15. A bold Spanish cavalier, who, in 1539, planned the conquest of Florida. He discovered the Mississippi River in April, 1541, and died in May, 1542.

16. St. Augustine. It was founded in 1565, by Melendez, a Spaniard. The second was founded by Espejo, a Spaniard, at Santa Fe, in 1582.

17. They claimed the northern part of the United States and Canada, having explored the great lakes and the Mississippi River from the Falls of St. Anthony to the Gulf of Mexico.

18. In 1534, by James Cartier. He claimed the country for the French king.

19. The region extending from near where Philadelphia now is, to Cape Breton. Acadia was afterwards confined to what is now New Brunswick, Cape Breton, and the neighboring islands.

20. In 1609, by Champlain, a famous pioneer, who afterwards led a party of Canadian Indians against the Iroquois, in northern New York, which region he was the first white man to enter.

21. After exploring the Atlantic coast at various points, they claimed this vast territory, naming it Virginia, in honor of Elizabeth, the Virgin Queen.

22. Francis Drake was an English sea captain, who sailed north along the Pacific coast, and explored the coast of California. Sailing homeward in 1579, he reached England by way of the Cape of Good Hope—second circumnavigation of the globe.

23. In 1583, by a brave man, Sir Humphrey Gilbert.

24. The attempted settlement was made at Newfoundland; but the enterprise was unsuccessful.

25. He then put back homeward; but the vessel in which he sailed was lost, and all on board perished.

26. Sir Walter Raleigh, who was a half-brother to Gilbert. His labors were unsuccessful.

27. All the territory from the 34th to the 38th degree of north latitude, viz.: the country between the southern limit of Maryland and Cape Fear.

28. The territory lying between the 41st and 45th degrees of latitude. This was called North Virginia.

29. At Jamestown, Virginia, in May, 1607.

30. The London Company; they were composed of noblemen, gentlemen, and merchants of London.

31. They based on the explorations by Hudson a claim to all the territory from the Connecticut River to the Delaware River. It took the name of New Netherlands.

32. Columbus was the first Spanish; John Verrazani, the first French; John Cabot, the first English; and Hudson, the first Dutch discoverer.

33. Henry Hudson was an Englishman, employed by the Dutch. He entered New York harbor in 1609, and sailed up the Hudson River, so called after the discoverer.

34. It was made at New York, in 1613.

35. It was made at Port Royal, Nova Scotia, in 1605.

36. Captain John Smith was one of the founders of Jamestown, who succeeded Ratcliffe, and governed the affairs of the colony very successfully.

37. The colony at Jamestown was divided into eleven boroughs, or counties, and the people were allowed to elect two representatives, or burgesses, from each, to a colonial assembly; and the assembly was called the "House of Burgesses."

38. In 1619, at Jamestown.

39. By the Dutch, in 1620.

40. In 1609, but the massacre was prevented by Pocahontas, who revealed the plot to the people of Jamestown.

41. In 1622, the savages fell upon all the outlying settlements, and murdered 360 persons.

42. In 1644; about 300 whites were slaughtered. It was followed by a war which lasted two years. The war ended in the complete subjugation of the Virginia Indians. They dwindled away, and were not afterwards troublesome.

43. The design of these acts was to give England the entire control of all the trade of the colonies. The Virginians were not allowed to send their products anywhere but to England; they were not allowed to buy goods anywhere but in England; and everything had to be carried in English vessels. This occurred in 1660.

44. It was in 1676. The cause of it was ill-feeling which had arisen between the people and the aristocratic party in Virginia.

45. Nathaniel Bacon was a patriotic young lawyer,

who rallied a company and defended the settlements against the Indians; he was denounced by Governor Berkley as a traitor, for acting without orders. During the contest which followed, Berkley was driven out of Jamestown and the village burned. In the midst of this struggle Bacon died.

46. The College of William and Mary was founded in 1692.

47. The Pilgrim Fathers belonged to a religious sect that had separated or seceded from the established church of England. On this account they were sometimes called Separatists.

48. By the Puritans, or Pilgrim Fathers, who landed at Plymouth, December 21st, 1620.

49. Roger Williams was a Puritan, who, in 1635, for liberal religious opinions, was banished from Massachusetts. He went into the wilderness and founded Rhode Island.

50. A superstition prevailed that persons were subject to the control of invisible evil spirits, and it is fully confirmed that 200 persons were accused, 150 imprisoned, 28 condemned, 19 hanged, and one pressed to death.

51. King Philip was chief of the Wampanoags, and succeeded in uniting the Narragansetts with him. The war occurred in 1675 and lasted one year. The cause of the war was the execution of three Indians by the English for the murder of an Indian convert, who had told the colonists that Philip was conspiring against them.

52. He was killed in a battle called the Swamp Fight, which took place in South Kingston, Rhode Island.

53. Yale College was founded at New Haven, Connecticut, in 1701.

54. Brown University was founded in 1764, in Rhode Island.

55. Harvard College was founded in 1638, at Cambridge, Massachusetts.

56. The Indians had become very troublesome to the

early settlers of Connecticut, who resolved to make war upon the Pequots. In the spring of 1637 Captain John Mason, with a small force of colonists and friendly Indians, marched against the Pequots in their principal stronghold. This was a fort on the Mystic River. The tribe was broken up; those who were not killed were captured and made slaves, or escaped and joined other tribes.

57. They called it New Amsterdam.

58. It was purchased of the Indians for sixty guilders —twenty-five dollars.

59. The colonies of Virginia claimed that Lord Baltimore's grant covered territory belonging to them. Clayborne, a member of the Jamestown council, having established two trading posts in Maryland, prepared to defend by force of arms. On the evening of the battle he fled to Virginia, and his party was defeated. Clayborne was tried for treason, but was acquitted. Ten years afterward he came back, raised a rebellion, and drove Lord Baltimore, then Governor of Maryland, out of the colony; Lord Baltimore returned with a large force, and Clayborne fled.

60. King William's War commenced in 1689 and lasted eight years.

61. The treaty of Ryswick, in 1697. It was agreed that each side was to have the same territory as before the war.

62. Queen Anne's War commenced in 1702 and lasted eleven years.

63. The treaty of Utrecht, in 1713. The only gain to England was the winning of Acadia.

64. It was the Boston News Letter, and was established in 1704, by Bartholomew Green.

65. It was first set up at Cambridge, Massachusetts, in 1639.

66. Jonathan Edwards was a great thinker and metaphysician.

67. King George's War commenced in 1744 and lasted four years.

68. The treaty of Aix-la-Chapelle, in 1748. It was agreed that both sides should restore the places taken. Accordingly, Louisburg was given up to the French.

69. The French and Indian War commenced in 1754 and lasted nine years.

70. It was disputed territory, as to whether the French or the English should be supreme on the American continent.

71. It was west of the Alleghany Mountains, along the Ohio River and the northern lakes.

72. At Kaskaskie, in Illinois, in 1690.

73. John Eliot was a minister who labored among the Indians, and for his devotion was called the Indian Apostle; he also translated the Bible into the Indian language.

74. William Kidd was a man sent out by England to suppress piracy, in 1696, but turned pirate himself; he was captured in Boston in 1699, sent to England, condemned and executed.

75. George Washington.

76. The French commandant sent back by Washington to Governor Dinwiddie, a letter, refusing to withdraw the French troops from the disputed territory. Washington marched to a place called Great Meadows, where he built Fort Necessity. Early in July, 1755, the fort was attacked by the whole French and Indian force, but was defended with such resistance that the French commander, Count de Villiers, sent in a flag of truce. Washington gave up the fort, but was permitted to march away with all the honors of war.

77. General Braddock, with a select force of 1,200 men.

78. When within ten miles of Fort DuQuesne, July 9th, 1755, Braddock, leading an advance body of about half his army, was attacked by the French and Indians concealed in the woods. Braddock was not accustomed to American bush-fighting, and did not know how to manage troops in a wooded country. The whole column was

thrown into confusion, and fled in a panic. Braddock was killed.

79. In November, General Forbes, with a column of 9,000 troops, marched against this position. The French force there, being now very much reduced, abandoned the fort. The name of Fort DuQuesne was changed to Fort Pitt—a name still preserved in Pittsburg.

80. The principal object was to capture Quebec. But two auxiliary operations were planned—one against Fort Niagara, the other against Forts Ticonderoga and Crown Point.

81. The English, under Johnson, met the French, commanded by Dieskau, near the head of Lake George, where a battle was fought, the English being victorious. Johnson, after building a fort which he called William Henry, feared defeat if he attempted to take Crown Point, and returned to Albany.

82. In July, General Abercrombie led a column of 15,000 troops against Fort Ticonderoga. It was held by Montcalm, with 4,000 troops. Abercrombie made a fierce assault on the fort, lost 2,000 men, and made a disorderly retreat to Fort William Henry.

83. Fort Niagara was captured by General Johnson, in July, 1759.

84. General Wolfe commanded the English, and Genenral Montcalm the French.

85. Wolfe began operations that were unsuccessful. Afterwards a bold design of scaling the Heights of Abraham was carried out. Here, on the 13th of September, 1759, was fought a battle that decided the war. Wolfe was twice wounded, but continued to lead the charge at the head of his grenadiers till he received a third and mortal wound.

86. Generals Wolfe and Montcalm. Wolfe hearing the shouts, "They fly! they fly!" asked, "Who fly?" "The French," was the answer. "Now, God be praised," exclaimed the dying soldier, "I die happy." Montcalm, when

told that he could live but a few hours, replied, "So much the better; I shall not live to see the surrender of Quebec."

87. The treaty of Paris, in 1763.

88. France gave up to England all her American possessions east of the Mississippi River, except the island and city of New Orleans. At the same time, France gave up to Spain all the country west of the Mississippi River. This was because Spain had aided her during the war against England. By the same treaty, Spain ceded to England, Florida, in exchange for Havana, which the English had taken the year before.

89. They had suffered very severely during the long French wars. The barbarities of Indian warfare had been brought to their firesides. It was with hope and joy the Americans now looked forward to a period of peace.

90. About the time the English took possession of the western forts great discontent was roused, for the French had won the hearts of the Indians. Pontiac, a chief of the Ottawas, formed a confederation of the Indians against the English. Eight forts were surprised and captured, and thousands of persons fled from their homes to avoid the scalping-knife. By a disagreement among the Indians the confederation was broken and a treaty signed.

91. The colonies were unfairly taxed, and not allowed the right of sending representatives to Parliament. England claimed that, as the French and Indian War had been made for the benefit of the colonies, the colonies should help pay the debt. The Americans denied that Parliament had a right to impose taxes. They said their own losses and expenses in the war had already been as heavy as they could bear.

92. The Stamp Act provided that all deeds, notes, bills, and other legal documents should be written on stamped paper. The act was passed by Parliament in the spring of 1765.

93. Patrick Henry. He proposed a series of resolutions, which claimed for the inhabitants of Virginia all the

rights of born British subjects. Henry made a speech of wonderful power, and the resolutions were adopted by the legislature.

94. The "Sons of Liberty" made it their special business to frighten the stamp officers. In all the colonies these officers were compelled to resign. The stamps which came were either unpacked, or else were seized and burned.

95. They decided and also adopted resolutions denouncing the Stamp Act as unconstitutional, and as going against their dearest rights.

96. The first Colonial Congress met in New York City, October 7th, 1765.

97. The Stamp Act was repealed February 22d, 1766.

98. William Pitt and Edmund Burke.

99. Parliament required the colonies to furnish quarters and supplies to British troops sent amongst them. New York refused. It occurred in 1765.

100. The Boston Port Bill was an act of Parliament forbidding the landing of goods in Boston.

101. It occurred in Boston, the 5th of March, 1770. A small guard of soldiers passing through the streets were so provoked by the jeers and taunts of a crowd of men and boys, that they fired, killing three persons and wounding several others.

102. Ships laden with tea were sent to various ports in America, and the Americans determined not to receive it. In Boston, a party of fifteen or twenty men, disguised as Mohawk Indians, on a clear, frosty, moonlight night, December 16th, 1773, marched to Griffin's wharf, where the ships were anchored, and, boarding them, threw into the sea, in the space of two hours, three hundred and forty-two chests of tea.

103. It was called at Philadelphia, September 5th, 1774. In this Congress all the colonies were represented except Georgia, whose Governor had prevented the elec-

tion of delegates. This body praised the conduct of Massachusetts, agreed upon a declaration of rights, recommended the suspension of all commercial intercourse with England, and sent a petition to the King.

104. General Gage, who had in Boston at that time about 3,000 troops.

105. The first battle of the Revolution was fought at Lexington, Massachusetts, April 19th, 1775.

106. The battle of Bunker Hill was fought on Breed's Hill, June 17th, 1775.

107. General Howe commanded the British, and General Prescott, the Americans. The American force was 1,500; loss, 450; the British force, 3,000; loss, 1,000.

108. He said: "I demand it in the name of the Great Jehovah and the Continental Congress."

109. The second Continental Congress met at Philadelphia, May 10th, 1775. It voted to raise an army of 20,000 men, and authorized an issue of $3,000,000, paper money. In June, Congress chose George Washington as commander-in-chief of the Continental Army.

110. The people of North Carolina were very bold. A band of patriots met at Charlotte, in Mecklenburg county, in May, 1775, and declared their independence of the King and Parliament.

111. At dawn, on the last day of the year, December 31st, 1775, both American Generals, but from different quarters, attacked the city. It was a stormy morning; the snow was falling fast, "and the wind piling it in drifts." Through all, with desperate courage, Montgomery led his men, as he supposed, to victory, but it proved to death; he was among the first who fell. Arnold, ignorant of the sad fate of Montgomery, pressed on, but was soon disabled by a severe wound, and carried from the field. General Morgan then took command, but courage was unavailing; the British troops surrounded them in greater numbers, and the division was forced to surrender. The prisoners were treated kindly. Arnold took command of the American

troops who had effected a retreat, and, recrossing the river, entrenched himself a few miles from the town.

112. The year 1776 witnessed the signing of the "Declaration of Independence."

113. That these united colonies are, and of right ought to be, free and independent states; and that all political connection between us and the state of Great Britain is, and ought to be, totally dissolved.

114. Thomas Jefferson, of Virginia.

115. On the 4th of July, 1776.

116. June 28th, 1776. It lasted ten hours, and ended in the repulse of the British.

117. Sir Peter Parker and Sir Henry Clinton, of the British; General Lee and Colonel Moultrie of the Americans.

118. Sergeant Jasper was a hero of Fort Moultrie. During the action, a British ball broke the flag-staff on the fort, and the colors fell over the parapet on the beach beyond. Jasper leaped over the breast-work, picked up the flag, and, unharmed by the fire from the fleet, sprang back into the fort, and, amidst the shouts of applause from his comrades, planted the flag of Carolina again upon the fort.

119. The battle of Long Island was fought August 27th, 1776.

120. On the American side, General Putnam; the British, General Howe and Sir Henry Clinton. American loss, 2,000; British loss, 200.

121. Washington passed north by the way of Harlem, White Plains, and Chester, then southwest through New Jersey to the Pennsylvania side of the Delaware River.

122. He proceeded to Trenton, December 25th, captured 1,000 Hessians and a large quantity of arms.

123. Because he knew the German custom of keeping that day with feasting and carousals, and believed that an attack then would be more than usually unexpected.

124. Rhode Island was captured December 8th, 1776, by Sir Peter Parker.

125. There were three: One of 35,000 men, under General Howe, whose headquarters were in New York; another of 7,000 in Canada, under Sir Guy Carleton; and a small detachment of about 5,000 in Rhode Island, commanded by General Prescott.

126. The battle of Princeton was fought January 3d, 1777. The Americans were successful.

127. General Hugh Mercer; a loss which was felt deeply by the Americans.

128. He captured the British General Prescott, with forty select soldiers.

129. The battle of Chad's Ford was fought September 11th, 1777. The British were successful.

130. Lydia Darrach was a Quaker woman, who revealed to Washington a plot that the British had arranged to attack him at White Marsh.

131. He was a gallant young French nobleman, who had come to fight for American Independence.

132. The battle of Germantown was fought October 4th, 1777; the Americans were repulsed, with a loss of 1,200 men.

133. The British went in and around Philadelphia; the Americans at Valley Forge.

134. Fort Ticonderoga was captured July 2d, 1777, by General Burgoyne.

135. The battle of Bennington was fought August 16th, 1777; the loss was 700 British, and about 100 Americans.

136. At Saratoga, October 17th, 1777, to General Gates.

137. It was a plot called the Conway Cabal. When the people heard of it, they were so indignant that its getters up were glad to sink into silence.

138. The Articles of Confederation were adopted in November, 1777.

139. At a little village on the Hudson, about nine miles south of Saratoga. Here was fought one of the severest battles of the war, September 19th, 1777.

140. Of the Americans, Benedict Arnold; General Burgoyne of the British.

141. Silas Deane was an American; and in 1776 was sent to France to urge an alliance.

142. The French Government decided to come out openly as the friend of America. A treaty to this effect was made between the two countries, February 6th, 1778.

143. Three commissioners were sent over to induce the colonies to return to their allegiance. But Congress refused to listen to any terms which did not acknowledge the independence of America.

144. General Joseph Reed. But says he: "I am not worth purchasing; but, such as I am, the King of Great Britain is not rich enough to buy me."

145. The battle of Monmouth was fought in New Jersey, June 25th, 1778. Owing to the conduct of General Charles Lee, nothing was gained. But Lee himself was got rid of, being dismissed from service for insolent behavior to General Washington.

146. Major Molly was a brave young Irish woman, who, seeing her husband fall at the battle of Monmouth, performed his duty with great skill and courage throughout the action. The soldiers gave her the nick-name of Major Molly, and being presented to General Washington the day after the battle, she received a Sergeant's commission and half pay for life.

147. A French fleet, directed by Count D'Estaing.

148. The Massacre of Wyoming occurred in Pennsylvania, July 3d, 1778, and was directed by a brute named John Butler, at the head of 1,600 Tories and Indians.

149. General Lincoln of the Americans; General Prevost of the British.

150. General Putnam was at this time commander of some American troops in Connecticut. With a force of

150 men, he attacked the British at Horseneck, who numbered nearly 1,500; but overwhelming numbers put his troops to flight. He miraculously escaped by galloping down the zigzag path of a precipice, leaving his astonished enemy to wonder at the daring of the fugitive who had so unexpectedly escaped.

151. July 15th, 1779. General Wayne commanded the Americans; Colonel Johnson the British.

152. All the dogs in the neighborhood had been killed to prevent their giving the alarm. The countersign had also been obtained from a negro who was in the habit of entering the garrison to sell fruit.

153. It was Palus Hook (now called Jersey City).

154. By Major Henry Lee. He took 159 prisoners, having lost only two of his own men in the attempt.

155. General Sullivan was sent by Washington, with a large force, which attacked the Indians on the frontiers of Pennsylvania and New York. The savages were everywhere defeated and forty of their villages burned.

156. The battle of Savannah was fought October 9th, 1779.

157. Count D'Estaing and General Lincoln of the Americans; General Prevost of the British.

158. There were left upon the field the brave Polish Count Pulaski, Sergeant Jasper, and many others that were very dear to their country.

159. Paul Jones was a Scotch-American of wonderful pluck and skill. He was also a very successful naval commander, and in September, 1779, when cruising off the coast of Scotland, fell in with two English frigates convoying a fleet of merchantmen. Jones attacked the frigates, and, after one of the most bloody sea-fights on record, captured both.

160. There was a very despondent feeling at the close of the year. The Americans had gained no important victory. Besides, American finances were in a very bad way. Congress had, from the start, been making paper

money to carry on the war. So much was issued that it greatly depreciated in value. To purchase provisions with this currency was at first difficult, and finally impossible. Unless American soldiers had been men who were fighting for principle, the war would now have utterly broken down.

161. In 1780, Sir Henry Clinton landed near Charleston, worked his way up to near the city, and in April began erecting works across the neck of land in rear of Charleston. On April 9th, the British fleet succeeded in passing Fort Moultrie, and anchored within cannon range of the city. The situation of the Americans in Charleston was now hopeless. Lincoln was compelled to surrender his force of about 5,000 men, May 12th, 1780.

162. Lord Cornwallis took command of the British army at the South. General Lincoln, now a prisoner in Charleston, was succeeded in his command by General Gates, the fortunate victor of Saratoga.

163. The battle of Camden was fought August 16th, 1780. The Americans were defeated with great loss.

164. Some of the brilliant exploits of Marion, Sumter, and Lee. They were self-denying, brave, and vigilant, and the united exertions of such leaders saved the South from despair.

165. Nathaniel Greene was one of the ablest of the American commanders, and, in December, 1780, superseded General Gates.

166. Benedict Arnold was an American traitor, who secretly assented to give up, treacherously, West Point into the hands of the British.

167. He was one of the heroes of the war. At Quebec, Fort Schuyler, and Saratoga, he performed deeds of the bravest daring.

168. Major Andre was a British officer, sent by Sir Henry Clinton to negotiate with Arnold.

169. Near Tarrytown he was waylaid by three countrymen, and, mistaking them for British, revealed to them

that he was a British officer. Dreadfully agitated on discovering his mistake, he urged bribes and entreaties to induce them to let him go. But they searched his person, found papers concealed, and carried them, with their prisoner, to Colonel Jameson.

170. The 24th of September, 1780; but, by the providence of Him who "bringeth the wicked devices of men to naught," America was saved from her secret foe.

171. He uttered these sad words: "Whom can we trust now?"

172. Andre suffered death as a spy, at Tappan, October 2d, 1780. Arnold escaped in safety to the British at New York.

173. At the close of this year, the British had two large armies in America—one under Sir Henry Clinton, whose headquarters were at New York, and another in the South, under Lord Cornwallis.

174. The battle of the Cowpens was fought January 17th, 1781. General Morgan of the American; General Tarleton of the British. American loss, about 70; British, 700.

175. The battle of Guilford Court House was fought March 15th, 1781. The commanders were, General Greene of the Americans; Lord Cornwallis of the British.

176. The battle of Eutaw Springs was fought September 8th, 1781.

177. He was not; although he accomplished the main object, and was a General of wonderful pluck and perseverance.

178. Lord Cornwallis surrendered October 19th, 1781, to General Washington.

179. John Adams, Benjamin Franklin, Henry Laurens, and John Jay.

180. It was signed September 3d, 1783, at Paris.

181. By this, Great Britain acknowledged the independence of the United States. The boundaries of the United

States were agreed upon as extending northward to the great lakes, and westward to the Mississippi.

182. The Confederation, by the articles that were drawn up, had the power of incurring debts, but no power of paying them. All it could do was to recommend the several states to pay each its own proportion. But the states had their own local debts, and business was very much depressed; so it was found very hard to meet the obligations of the general government.

183. In Massachusetts the people refused to pay their taxes, and threatened to overthrow the government. The military had to be called out to put it down.

184. The Constitution was adopted in 1788.

185. There were two—the Federalists, who favored the adoption of the Constitution, and the Anti-Federalists, who opposed it.

186. On April 30th, 1789, at New York.

187. Alexander Hamilton, Secretary of the Treasury; Thomas Jefferson, Secretary of State; Henry Knox, Secretary of War; and Edmund Randolph, Attorney General.

188. In the year 1790.

189. It was established in 1791, at Philadelphia.

190. Citizen Genet, in 1793. This person was very indiscreet. He thought that, as there was a great deal of popular enthusiasm for France, he might do anything; so he went to work fitting out privateers. Washington had to demand his recall.

191. The yellow fever broke out in Philadelphia, and raged with such virulence that, in three months, out of a population of 60,000, no less than 4,000 perished.

192. In 1794, the people of western Pennsylvania resisted the collection of taxes on distilled spirits, and rose in arms against those who endeavored to enforce the laws. Washington had to send an armed force into the region.

193. The boundaries between the Spanish possessions of Louisiana and Florida and the United States had never

been definitely fixed. In 1795, a treaty was made with Spain, which arranged this question, and gave the United States the right of navigating the Mississippi River.

194. In 1793. There was war declared by France against England, Spain, and Holland, and finally all Europe became involved.

195. Adams was inaugurated March 4th, 1797.

196. It was a triumph for the Federalists, who desired the principles of Washington's administration should continue to be pursued.

197. The recent treaty with England. The French government refused to receive the ambassadors of the United States; but it was hinted to them that if money were paid by the United States to France, the latter would be more likely to enter into negotiations.

198. Mr. Pinckney, one of the ambassadors, nobly replied: "Millions for defence, but not one cent for tribute."

199. Napoleon Bonaparte. He, in the autumn of 1799, overthrew the government of France, and took the control of affairs into his own hands. Napoleon made a treaty of peace with the United States in 1800.

200. Washington was removed from the scene of his earthly glories. He died at Mount Vernon, December 14th, 1799, at the age of sixty-eight years.

201. In the year 1800.

202. Thomas Jefferson was inaugurated March 4th, 1801.

203. The Republican or democratical party—the party that was opposed to the Federalists.

204. The "Alien Law" gave the President the right of expelling from the country any foreigner who was regarded as dangerous to the United States. The "Sedition Law" said that any person who published anything false or malicious against the President or Congress might be fined or imprisoned. They were in 1778.

205. The purchase of Louisiana from France by the United States, in 1803. The price paid was $15,000,000.

206. The Louisiana purchase included all territory west of the Mississippi River to the Rocky Mountains, and north to the British possessions. The purchase was of the utmost importance to the United States, as it secured the undisputed navigation of the Mississippi River.

207. American commerce suffered greatly from the people of the Barbary States, who were known as pirates. They also held the crews of captured vessels until ransomed. The war occurred in 1805.

208. In July, 1804, a duel, growing out of a political dispute, was fought between Aaron Burr and Alexander Hamilton. Hamilton was killed, a fact greatly lamented by the people of the United States.

209. In 1806, Aaron Burr was found making secret preparations for an expedition down the Ohio River. He was accused of plotting to separate the country west of the Alleghanies from the Union; and also of a design to conquer Mexico. Burr was arrested, and tried on these charges. For want of proof, he was set at liberty.

210. The British claimed that their vessels had a right to search American ships, and take from them any seamen of English birth. The American government indignantly denied this pretended "right;" and the more so, as several times American seamen were seized and forced into the British navy, under the pretence that they were deserters.

211. The Milan Decree was an act by Napoleon that confiscated all vessels that had submitted to search by an English ship, or had paid tribute.

212. James Madison was inaugurated March 4th, 1809.

213. It was a triumph of the Republicans, who now for the first time began to be called Democrats.

214. It was an act forbidding all commerce of the United States with Great Britain and France.

215. In 1811, the Indians on the northwestern frontier became very hostile, and took the war-path. General Harrison, Governor of Indiana Territory, collected a large force, and marched against them. Their principal chief,

Tecumseh, and his brother, "The Prophet," were not present; but on the approach of General Harrison, other chiefs came out to meet him. They proposed a conference, and requested him to encamp for the night, which he did. Early next morning the Indians rushed upon the camp, and a bloody contest followed. This action took place near the Tippecanoe River, and hence was called the battle of Tippecanoe.

216. It was the declaration of war against England, and the hostilities which followed for two years.

217. The conduct of England in annoying the commerce of the United States, and the impressment of seamen from American vessels.

218. In midsummer, General Hull, Governor of Michigan Territory, crossed from Detroit, in that territory, with a small force, to Sandwich. Hull was incompetent. He did nothing at Sandwich, and while trifling there a British force captured the important post of Mackinaw. This made Hull return in haste to Detroit. A small British force now appeared before Detroit. The American soldiers were perfectly confident they could hold the place against the British. Nevertheless, when Hull was called on to surrender, he hung out the white flag and capitulated without striking one blow. The army and the whole country were very indignant at this disgraceful affair, and Hull's name was struck from the rolls of the army.

219. On the 13th of October, an American detachment crossed the Niagara River from Lewiston into Canada, and attacked the British on Queenstown Heights. The Americans were at first successful, but were at last overpowered, chiefly owing to the fact that the American militia on the American side would not cross to aid their brethren.

220. The capture of the sloop-of-war Alert, by the Essex, August 13th; the Guerrier, by the Constitution, August 19th; the Frolic, by the Wasp, October 18th; the

Macedonian, by the United States, October 25th; the Java, by the Constitution, December 29th.

221. During the year 1812 about three hundred prizes were taken. This was some return for the numerous British captures in time of peace.

222. The Army of the West, under General Harrison, was stationed near the head of Lake Erie; the Army of the Center, under General Dearborn, on the Niagara frontier; the Army of the North, under General Wade Hampton, near Lake Champlain.

223. The object was to recover Detroit and Michigan from the English. In January, 1813, a body, under General Winchester, advanced on Frenchtown, beating a British party and taking the village. Soon after, a larger force of English and Indians attacked Winchester's detachment and compelled his surrender. The next morning the Indians brutally murdered all the sick and wounded Americans.

224. General Harrison. Here he was besieged May 1st, by Colonel Proctor. An American reinforcement came, and the British gave up the siege and returned to Malden.

225. The battle of Lake Erie was fought on the 10th of September, 1813.

226. Two squadrons met in the western part of Lake Erie, and a fierce naval action began. The combat lasted three hours, and resulted in a brilliant victory. Commodore Perry—commander of the American squadron—told this triumph in a brief and modest dispatch, saying: "We have met the enemy, and they are ours."

227. Here an action was fought, October 5th. The Western Rangers charged furiously, and completely routed the British and the Indians under Tecumseh. The Indian chief was slain.

228. During this year, the Creek and Seminole Indians commenced a war against the whites in Georgia and Alabama. In August, they captured Fort Mimms, in south-

ern Alabama, and 300 men, women, and children were butchered.

229. General Jackson.

230. The whites flew to arms, and the Indians were defeated in a number of fights. The last great encounter was at Horseshoe Bend, on the Tallapoosa River. Here Generals Jackson and Coffee gave the Indians a terrible defeat, slaying over 800 of them. This brought the Creek war to an end.

231. The capture of the British brig Peacock by the sloop-of-war Hornet, February 24th; the Boxer, by the Enterprise, Septemper 5th; Barkley's fleet, by Perry's fleet, September 10th.

232. Captain Lawrence was killed June 1st, 1813, in an engagement between the Chesapeake and the Shannon, off Boston harbor. His last words were: "Don't give up the ship."

233. The Essex, a United States vessel, under the command of Captain Porter, after making a successful cruise, during which she had taken twelve British armed ships and 400 prisoners, was captured on the 28th of March, 1814, at Valparaiso. In neutral waters, off the Chilian coast, the Essex was attacked by two English vessels of superior strength—the ship Phœbe and the war-sloop Cherub. Great as was the disparity of force, Porter refused to strike his flag, and the desperate conflict was waged. At the end of two hours and a half, when the noble frigate was on fire, her decks strewed with the bodies of her gallant crew, and but a single officer left to support him, the American captain reluctantly surrendered his vessel. But for humanity to the wounded, who must have perished with him, he would have gone down with his flag still flying.

234. There were two—the Northern campaign and the Southern campaign.

235. The battle of Lundy's Lane was fought July 25th, 1814. The commander on the American side was Gen-

eral Scott; on the British side, General Drummond. The action was not decisive. Each side lost about 800 men.

236. In September, 1814, Sir George Prevost, at the head of 14,000 troops, advanced upon Plattsburg, on Lake Champlain. Here General Macomb was stationed with a force of less than 2,000 men. The American squadron, commanded by Commodore Macdonough, was lying in the harbor of Plattsburg. The British force arrived before Plattsburg September 6th. General Macomb made a firm defence, and for four days kept the enemy at bay; yet the situation of the American force was critical. In this state of affairs the British squadron, under Captain Downie, bore down in order of battle. Commodore Macdonough cleared his decks for action. After a contest of two hours, the whole British fleet on the lake was captured by the Americans. The British land force then retreated in hot haste to Canada. The enemy's loss was about 2,500 men.

237. It was burned August 24th, 1814. General Ross commanded the British.

238. There was strong opposition to the war, particularly in New England. This convention was composed of delegates from the New England states, and met in December, 1814. All that came of it was a report recommending some changes in the Constitution.

239. A treaty of peace was made on the 24th of December, 1814, at Ghent.

240. The war of 1812 lasted a little over two years and a half.

241. The battle of New Orleans was fought on the 8th of January, 1815. The entire British army, under Sir Edward Packenham, advanced to storm the entrenchments. It met a terrible repulse. Jackson won a great victory, killing and wounding 2,000 of the British, with a loss of 8 men killed and 13 wounded. Packenham was killed.

242. It was about $127,000,000.

243. The American navy forever settled the question of

sailor's rights, and the terms of the treaty were satisfactory to both parties.

244. Monroe was inaugurated March 4th, 1817.

245. It was not; he was elected almost unanimously by the whole people. The war of the politicians stopped for a time. This period received the name of the "era of good feeling."

246. The "Missouri Compromise" was a bill that originated in 1820, admitting Missouri into the Union in 1821, as a slave state; but prohibited slavery in all territory west of the Mississippi, and north of 36° 30′ north latitude. It was proposed by Henry Clay.

247. In 1823, President Monroe asserted: "That the American continent, by the free and independent condition which they have assumed and maintained, are henceforth not to be considered subjects for future colonization by any European powers."

248. General LaFayette. He remained in this country for over a year, and was received everywhere with the greatest honor and affection.

249. J. Q. Adams was inaugurated March 4th, 1825.

250. In the latter part of Monroe's administration, the two political parties—Federal and Republican—were very much broken up. John Quincy Adams was a Republican, but became one of the leaders of that party which was afterwards called the Whig party.

251. The corner-stone of the Bunker Hill Monument was laid on the fiftieth anniversary of the battle—June 17th, 1825—by General LaFayette.

252. John Adams and Thomas Jefferson.

253. The "American System" was a protective tariff enacted by Congress in 1828. Henry Clay was the author of this policy. It led afterwards to violent political disputes.

254. In the year 1827, at Quincy, Massachusetts.

255. It was commenced in 1828. The Baltimore and Ohio.

256. Jackson was inaugurated March 4th, 1829.

257. It was a victory for the party opposed to the Whigs, represented by Adams and Clay. The party which elected Jackson now began to be called the Democratic party.

258. The Black Hawk war occurred in 1832. The western Indians, under Black Hawk, began hostilities against the people of Illinois. A battle was fought on the banks of the Mississippi, and the Indians were defeated. They were forced to make treaties, by which they gave up large tracts of western lands.

259. The "Nullification Ordinance" declared the tariff laws *null* and *void*, and that the state—South Carolina—would secede from the Union if force should be employed to collect any revenue.

260. John C. Calhoun, of South Carolina.

261. The Florida War commenced in 1835, and lasted seven years.

262. Van Buren was inaugurated March 4th, 1837.

263. The election of Van Buren was a triumph for the Democrats. It was a continuation of Jackson's policy.

264. The "Financial Crisis" of 1837.

265. The Canadian Rebellion broke out in 1837. Many Americans crossed the line to help the patriots. This obliged the President to issue a proclamation that those who invaded Canada would lose the protection of their government.

266. Congress passed the Sub-Treasury Bill in 1840. It was intended to provide for the safe-keeping of the public funds.

267. Harrison was inaugurated March 4th, 1841.

268. The election of Harrison was a triumph of the Whig party. The Whigs said the distress of the country was in great part owing to the financial experiments of the Democratic administrations, and that the Sub-Treasury Law was wrong. Hence they carried the day.

269. He remained in office one month.

270. A bill for establishing a United States Bank. Every member of President Tyler's Cabinet, except Daniel Webster, immediately resigned.

271. It was settled in 1842, by two commissioners—Daniel Webster and Lord Ashburton

272. In 1842, certain parties of Rhode Island wished to change the Constitution. A party, headed by Dorr, favored the change; another party opposed it. Dorr and his friends took up arms, and it seemed as though there would be civil war. The President had to send troops to keep the peace. The new Constitution was adopted the same year.

273. The tenants on some of the old *patroon estates*, in New York, refused to pay the rent. Some assumed the disguise of Indians, tarred and feathered those who paid their rents, and even killed officers who served warrants upon them.

274. The first telegraph was built between Washington and Baltimore, in 1844. The first message was the announcement of Polk's nomination for President of the United States.

275. The cotton-gin was invented in 1792, by Eli Whitney, an American.

276. Polk was inaugurated March 4th, 1845.

277. It was a triumph of the Democratic party. The Whigs had put up Henry Clay. Polk was pledged to the annexation of Texas. The Whigs were opposed to it; the Democrats won.

278. The most important fact of Polk's administration was the Mexican War, which occurred in 1845.

279. The battle of Palo Alto was fought on the 8th of May, 1845. General Taylor commanded the Americans; General Arista the Mexicans. American troops, 2,300; Mexican troops, 6,000. The Mexicans were defeated.

280. Monterey was surrendered to the Americans September 24th, 1846.

281. The battle of Buena Vista was fought February 23d, 1847. General Taylor commanded the Americans;

General Santa Anna the Mexicans. The Americans were successful.

282. John C. Fremont was a topographical engineer, and was sent by the government, with a small exploring party, to seek a new route to Oregon. While in California, in 1844, a message from Washington came to Fremont to protect the interests of the United States in California. The American settlers now flocked to Fremont's standard. The Mexicans were beaten, and compelled to retire southward. By Fremont's advice, the American settlers in California declared their *independence* of Mexico, July 5th, 1846.

283. Vera Cruz was surrendered to the Americans March 29th, 1847. To General Scott.

284. On the 17th of September, 1847. To General Scott. The American troops numbered 10,000; the Mexican troops 30,000.

285. The treaty of Guadaloupe Hidalgo, concluded February 2d, 1848. Peace was proclaimed by President Polk on the 4th of July, 1848.

286. The treaty of Guadaloupe Hidalgo ceded to the United States all the vast territory now comprised in New Mexico, Utah, and California. In return, Mexico received a compensation of $15,000,000.

287. Taylor was inaugurated March 5th—the 4th being Sabbath—1849.

288. The election of Taylor was, in some degree, a triumph of the Whig party. The most exciting question had been whether slavery should be allowed in, or kept out of, the new territories.

289. It concerned the admission of the state of California, whether it should be admitted into the Union as a slave state or a free state. This question was discussed with great bitterness by both political parties.

290. Henry Clay proposed, in Congress, a compromise bill. This provided: First, That California should be admitted as a free state. Second, That the territory of Utah

should be established without mention of slavery. Third, That the territory of New Mexico should be established without mention of slavery, and that $10,000,000 should be paid to Texas in purchase of her claim to Mexican lands.

291. The Fugitive Slave Law provided for the arrest and return of fugitive slaves who had escaped to a free state. This law was passed in 1850.

292. President Taylor died on the 9th of July, 1850, after having been in office sixteen months. Vice-President Fillmore became President.

293. Henry Clay and Daniel Webster.

294. Pierce was inaugurated March 4th, 1853.

295. The election of Pierce was a triumph to the Democratic party. The Whigs had put up General Winfield Scott as their candidate; but Pierce carried the day.

296. There was a dispute between the United States and Mexico as to the boundary line. General Gadsden negotiated a settlement, whereby $20,000,000 were paid Mexico for additional territory, and the United States was to receive in return the territory of Arizona.

297. The Kansas-Nebraska Bill provided for the organization of two territories, to be called Kansas and Nebraska; and in regard to slavery, which was the exciting question of the time, the people of these territories were to decide whether they would have slaves or not. It was presented by Stephen A. Douglas, and became a law in May, 1854.

298. Buchanan was inaugurated March 4th, 1857.

299. It was a triumph to the Democratic party. The Republicans had brought forward as their candidate John C. Fremont. The Republican candidate received a large number of votes, showing how strong the anti-slavery sentiment in the North had become. But a majority of the people of the United States did not think that the Constitution gave any right to interfere with slavery. Buchanan's election greatly disappointed the Republican party.

300. The Supreme Court of the United States decided that the Missouri Compromise was unconstitutional, and

that slave-owners might take their slaves into any state in the Union without forfeiting authority over them. Dred Scott was a slave, and claimed freedom on the ground that he had been taken into a free territory. This decision was given in 1857, by Chief-Justice Taney.

301. It was a mad scheme, devised by an old man named John Brown, who, with his sons, had taken an active part in the border warfare in Kansas. His plan was to liberate the southern slaves. With but twenty-one followers, he began by seizing the United States arsenal at Harper's Ferry, Virginia, October 16th, 1859. But here he and his party were overpowered by the state and Federal troops. Most of the raiders were killed. John Brown and six of his associates were tried and convicted, and were hanged December 2d, 1859.

302. Abraham Lincoln, Stephen A. Douglas, John C. Breckinridge, and John Bell.

(*a.*) Lincoln, candidate of the Republican party, held: There is no law for slavery in the territories, and no power to enact one, and Congress is bound to prohibit it in, or exclude it from, every Federal territory.

(*b.*) Douglas, candidate of the Northern Democracy, held: Slavery, or no slavery, in any territory, is entirely the affair of the white inhabitants of that territory. They can have it if they choose, can exclude it if they choose, and neither Congress nor the people of the country outside of that territory have any right to meddle in the matter.

(*c.*) Breckinridge, the candidate of the Southern Democracy, held: Any citizen has a right to migrate to any territory, taking with him anything that is property—including slaves—and Congress is bound to protect the rights of slaveholders in all the territories.

(*d.*) Bell, candidate of the Union Constitutional party, held: The "Constitution" of the country, the Union of the states, and the enforcement of the laws.

303. The agitation of the slavery question. The Southern states affirmed that they had a right to secede from the

Union, seceded; but the Northern states denied that right, raised armies, and enforced their authority.

304. South Carolina, by a unanimous vote, December 20th, 1860..

305. In the month of January, 1861, Mississippi, Alabama, Florida, Georgia, and Louisiana; and on the 1st of February by Texas—so that at the latter date, the seven cotton states had withdrawn from the Union.

306. On the 4th of February, 1861, a convention of the seceded states met at Montgomery, Alabama, and there adopted a constitution, and organized a government under the name of the Confederate States of America.

307. Jefferson Davis was chosen President, and Alexander H. Stephens Vice-President. Davis was inaugurated February 4th, 1861.

308. Lincoln was inaugurated March 4th, 1861.

309. Major Anderson surrendered the fort to Beauregard, April 13th, 1861.

310. President Lincoln issued a proclamation, April 14th, calling for 75,000 men to serve for three months.

311. At Baltimore, on the 19th of April, 1861, a Massachusetts regiment was attacked by a mob. Three soldiers were killed and several wounded.

312. Elmer E. Ellsworth was a Colonel in the late war. Was sent to Alexandria with a detachment of zouaves. Shortly after reaching that place, he observed a Rebel flag flying from the roof of a public house, entered, and sprang up the staircase for the purpose of hauling it down. As he descended, bearing the flag, Jackson, the proprietor of the house, shot him through the heart.

313. The battle of Philippi was fought June 3d, 1861.

314. The battle of Rich Mountain was fought July 11th, 1861. General Pegram commanded the Rebels; and General McClellan the Federals. The Federals were successful.

315. The battle of Bull Run was fought July 21st,

1861. General McDowell commanded the Federals; General Beauregard the Rebels. The Rebels were successful.

316. President Lincoln called out half a million of troops.

317. The battle of Ball's Bluff was fought October 21st, 1861. The Federals were repulsed, and the Union commander, Colonel Baker, was killed.

318. The battle of Wilson's Creek was fought August 10th, 1861. General Lyon commanded the Federals, with a force of about 5,000 men. Generals Price and McCulloch commanded the Rebels, with a force of 23,000 men. The Rebels were successful.

319. General Lyon. He was leading his men into the thickest of the fight and was killed by a rifle ball.

320. The battle of Belmont was fought November 7th, 1861, in Missouri. General Grant's force was compelled to take to its gunboats, and make its way back to Cairo.

321. On the 1st of November, 1861, on account of age and physical infirmities, General Scott retired from active service as Lieutenant-General of the Armies of the United States; and was succeeded in command by Major-General McClellan.

322. A *proclamation of neutrality* (May 13th), acknowledging the South as a belligerent power. France soon after did the same.

323. It was the celebrated "Trent affair."

324. Mason and Slidell, two Confederate commissioners to the British government, ran the blockade, and, at Havana, took passage on board the Trent, an English mail-steamer. The day after leaving (November 8th), the Trent was stopped by the United States war vessel San Jacinto, commanded by Captain Wilkes. Mason and Slidell were seized and carried to Fort Warren.

325. When the tidings of their seizure reached England, the British government demanded the surrender of the envoys, and began preparations for war.

326. By the United States concluding to give up Mason and Slidell.

327. The reason why the government gave them up was because the United States had all along, and especially during the War of 1812, taken a position respecting the rights of neutral ships that did not justify Captain Wilkes in taking the Confederate commissioners from the Trent.

328. The Confederates held a defensive line running from the Mississippi River eastward to the Cumberland Mountains. The left was at Columbus, on the Mississippi River. Forts Henry and Donelson guarded the Cumberland and Tennessee Rivers. A considerable army at Bowling Green covered the great railroad lines southward to Nashville. The right flank was held by a force posted at Mill Spring, Kentucky.

329. On the Union side, there was an army at Cairo and vicinity, under General Grant. Bowling Green was threatened by an army under General Buell. The force at Mill Spring was threatened by a body of troops under General G. H. Thomas.

330. General Albert Sidney Johnston was in command of the Southern forces in the West.

331. General Halleck was General-in-Chief of the Western forces.

332. The battle of Mill Spring was fought on the 18th and 19th of January, 1862. General Thomas commanded the Union forces; General Zollicoffer, the Rebels.

333. The Federals were successful; and the Southern General, Zollicoffer, was killed.

334. On the 16th of February, 1862, to General Grant.

335. On the 23d of February, 1862, to General Buell.

336. It was surrendered on the 7th of April, 1862, to Commodore Foote and General Pope.

337. On the 6th and 7th of April, 1862, General Grant commanded the Union forces; General Albert Sidney Johnston, the Rebels.

338. The Rebels numbered about 40,000 men; he

Union army, 57,000. The Rebels were successful in the onslaught, and drove the Union army from the field and down to the shelter of the gunboats. But General Johnston was killed, and during the afternoon Buell's army came up; so that when, the following morning, an advance was made by the Union army, the Rebels retired to Corinth.

339. The Union loss was nearly 15,000; the Rebel loss was 10,699, killed, wounded, and missing.

340. The battle of Perryville was fought October 8th, 1862. General Bragg commanded the Rebels; General Buell, the Federals.

341. It began on the 31st of December, 1862. The following day—January 1st, 1863—it was renewed, and continued the greater part of the third day (January 2d.) General Rosecranz commanded the Union troops; General Bragg, the Rebels.

342. The Union army numbered 47,000; the Rebel army, 35,000 men. The Union loss was very heavy, nearly 14,000 men; while the Rebel loss was heavy, also, over 10,000 men killed, wounded, and missing.

343. Neither side gained a decided victory. At the close of the bloody contest it was still a "drawn" battle.

344. The battle of Pea Ridge was fought on the 7th and 8th of March, 1862. General Van Dorn commanded the Rebels; General Curtis, the Union forces. Van Dorn was defeated.

345. New Orleans surrendered to Commodore Farragut, April 28th, 1862.

346. John Morgan was a Rebel leader of a band of guerrillas and raiders in Tennessee. He repeatedly rode through Kentucky, spreading terror in his path, burning towns, levying tribute, destroying telegraphs and railways, and carrying off prisoners. In one raid alone, he boasted of having "taken seventeen towns and cities, with a very heavy amount of army stores."

347. The battle of Richmond was fought on the 30th of August, 1862. The Rebels were victorious.

348. The Merrimac was one of the vessels which had escaped destruction when the Federals, in April of the previous year, had abandoned Norfolk Navy Yard. Seized by the Rebels, plated fore and aft with steel, surmounted with a bomb-proof covering of heavy timber, strengthened by bars of railroad iron, and her bow furnished with a ponderous "ram" of steel, she had become a formidable engine of naval warfare.

349. "In vain the Cumberland and Congress rained full broadsides on the iron-clad vessel. The balls struck and glanced upward, having no more effect than peas from a popgun." At the end of that day's fight, the Cumberland had gone down; the Congress, riddled by the balls of the enemy, had struck her colors, and, catching fire, was burned to the water's edge; and the Minnesota, injured and aground, awaited what seemed inevitable destruction on the ensuing day.

350. The floating battery, Monitor, in command of Captain John S. Worden, of the United States Navy.

351. The Monitor bore the appearance of a long, oval raft, surmounted with a low, round tower, and a pilot-house. It was the new invention of Ericsson, the Swedish engineer.

352. It was fought March 9th, 1862. Early in the morning, the Rebel monster hastened to bear down upon her prey—the helpless Minnesota. Then gallantly the little Monitor steamed right alongside of the giant Merrimac, a very pigmy in comparison, and opened fire upon her. It was returned by "whole broadsides from the Rebels, but with no more effect, apparently, than so many pebble-stones thrown by the hand of a child." Bravely the little champion shielded the Minnesota, and fought her great antagonist; and, at the end of five hours, the latter withdrew from the contest, acknowledging the Monitor to be

more than her match, though not one-third the size of this naval Goliath.

353. With barely 6,000 men, May 23d, 1862, Banks was attacked by Stonewall Jackson, with a force exceeding 15,000. The first onset of the enemy was upon the Federal advance at Front Royal, and resulted in the killing or capturing of the Union garrison there. Jackson then advanced upon Strasburg, where the main army was posted, and Banks retreated, closely pursued and attacked by the enemy. On the 25th, after suffering severe losses, he crossed the Potomac.

354. The battle of Fair Oaks was fought on the 31st of May, 1862. General Casey commanded the Union troops; General J. E. Johnston, the Rebels. It was not decisive.

355. The battle of Cedar Mountain was fought August 9th, 1862. General Banks commanded the Union troops; General Jackson, the Rebels. The Rebels were successful.

356. On the 29th and 30th of August, 1862, in which the Rebels were worsted on the first day's encounter, but gained the advantage on the second.

357. On September 15th, 1862, the garrison of 12,000 men was surrendered to Stonewall Jackson.

358. The battle of Chantilly was fought September 1st, 1862. Generals Kearney and Stevens were killed.

359. The battle of Antietam was fought September 17th, 1862, and was one of the most hotly contested conflicts of the war. The combat raged all day, and both armies were badly shattered. But the Union army held the ground, and Lee was compelled to recross the Potomac into the Shenandoah Valley.

360. The battle of Fredericksburg was fought December 13th, 1862. The Union army was defeated, with a loss of about 11,000 men.

361. On January 1st, 1863, President Lincoln issued

the Emancipation Proclamation, which declared free all slaves within the borders of the Confederate States.

362. The battle of Chancellorsville was fought May 2d and 3d, 1863. General Hooker commanded the Union forces; General Lee, the Rebels. The Rebels inflicted terrible loss on the Union army, the loss being over 17,000 killed and wounded.

363. The famous Stonewall Jackson was killed through mistake, in the darkness, by one of his own men.

364. The battle of Gettysburg was fought July 1st, 2d, and 3d, 1863. The Rebels were repulsed, losing in killed, wounded, and missing, over 30,000 men.

365. General Meade commanded the Union troops; General Lee, the Rebels.

366. Lee retreated after this battle, recrossed the Potomac, moved up the Shenandoah Valley, and took position on the south side of the Rapidan River. The Army of the Potomac followed up, and placed itself on the north side of the Rapidan. In this situation the two armies confronted each other, without any event of importance, during the remainder of the year 1863.

367. Pemberton surrendered Vicksburg, with 27,000 prisoners, July 4th, 1863, to General Grant.

368. It lasted for six weeks. Pemberton had hoped that General J. E. Johnston, who was hovering about the rear of the Union army with a small force, would relieve him. Johnston could do nothing. The Vicksburg garrison was compelled to surrender or starve.

369. Port Hudson was surrendered July 9th, 1863, to General Banks. It was impossible to hold out after Vicksburg was gone, and by these operations the Mississippi River was opened throughout its entire length.

370. The battle of Chickamauga was fought September 19th and 20th, 1863. General Rosecranz was commander of the Union troops; General Bragg of the Rebels.

371. The Union army was beaten. But General G. H.

Thomas fought so stubbornly that it was able to retire and fortify itself in Chattanooga.

372. The battle of Lookout Mountain was fought on the 24th of November, 1863. General Hooker commanded the Union forces; General Bragg, the Rebels. The Rebels were defeated.

373. Here, at an early hour, November 25th, 1863, Sherman advanced to the assault of the Rebels' strongest position. Summoning all his reserves, the enemy repulsed this attack, but meanwhile the whole line of the Union forces advanced to storm the hill. "With cheers answering to cheers, the men swarmed upward," those heights bristling with not less than forty pieces of artillery, and no one knew how many muskets were carried, and the six-mile battle-ground of Missionary Ridge was won.

374. The battle of Knoxville was fought November 30th, 1863. General Burnside commanded the Union troops; General Longstreet, the Rebels. The Rebels were defeated.

375. During the session of Congress which ended in March, 1863, the Conscription Act became a law. Under this act the President ordered a draft for 300,000 men. This led to a riot in New York city—July 13th—by which 150 lives were lost, and a very large amount of property was destroyed.

376. At the close of 1863, the Union forces held possession of the Mississippi River, of the states of Missouri, Arkansas, Kentucky, and Tennessee, and of a large portion of Mississippi, Louisiana, and Florida.

377. On the 28th of February, a bold and successful raid was made by Kilpatrick's cavalry upon the exterior defences of Richmond. One detachment tore up the track of the Virginia Central Railroad, near Frederick's Hall, and destroyed six important grist-mills, while the main body, under Kilpatrick, advanced to the junction of the Fredericksburg and Gordonsville line of railway, destroyed the track, cut the telegraph wires, and pushed on to within

three miles of Richmond. There the enemy's works were found too strong to be assailed by a force of cavalry, and Kilpatrick withdrew, camping that night six miles from the Rebel capital.

378. In this expedition many miles of railroad were cut, several hundred prisoners captured, and $7,000,000 of Rebel property destroyed.

379. Colonel Dahlgren, and a part of his command, which had broken up the track of the Virginia Central Railroad, and the grist-mills on the James River Canal, fell into an ambush of the enemy, and were taken in the attempt to cut their way through. Colonel Dahlgren was killed, and his remains treated by the Rebels with indignity.

380. On the 10th of March, 1864, with headquarters at Washington, and in the field.

381. The battle of the Wilderness was fought on the 5th and 6th of May, 1864. General Grant commanded the Union forces; General Lee, the Rebels. Neither side was victorious.

382. He wrote: "I propose to fight it out on this line, if it takes all summer."

383. On the night of the 7th, both armies moved fifteen miles to the southeast, in the direction of Spottsylvania. On the 8th, the Rebels, falling back towards this point, and fighting the Union forces under Warren, reached it first, and seizing Spottsylvania Ridge, made it a strong bulwark of defence. For twelve days and nights ensued fierce assaults in the vain endeaver to carry these impregnable lines.

384. On the 21st, the Federals turned the strong position of the enemy at Spottsylvania, by a flank movement, and advanced toward the Rebel capital. Another race by the two armies then followed, accompanied by battles and skirmishes. Finally, on the 28th, Grant crossed the Pamunkey, and advanced, still fighting, to within ten miles of Richmond.

385. The enemy was posted on the Chickahominy, covering the approach to the capital. In the assaults made upon this new line of position, the Federal troops were repulsed, and, on the 12th of June, General Grant, convinced of the hopelessness of dislodging the enemy from his strong defences on the banks of the Chickahominy, abandoned the operations against Richmond from the north, and transferred his army to the south bank of the James.

386. It lasted from June, 1864, to April, 1865. A great number of actions, and several important battles, took place. Sometimes one side was successful, sometimes the other; but there was no grand, decisive combat.

387. A mine of powder, which had been run under one of the Rebel forts before Petersburg, was fired July 30th, and carried the earthwork into the air. A storming column then advanced to press through to Petersburg, but the troops were repulsed with great slaughter.

388. In July, Lee sent a column northward, under General Early, to threaten, and, if possible, capture Washington. Early crossed the Potomac into Maryland, where he defeated a force of Union militia, under General Lew. Wallace, at Monocacy, July 9th, and then advanced to the works around Washington.

389. Finding the Washington works much stronger than was expected, Early returned to Virginia. He took with him great booty from Maryland and Pennsylvania, and burned the town of Chambersburg, July 30th.

390. The battle of Winchester took place September 19th, 1864. General Early commanded the Rebels; General Sheridan, the Union troops. The Rebels were defeated and retired southward.

391. At Cedar Creek, Sheridan's army—he being absent—was attacked by Early, October 19th, and routed. After retreating some miles, a stand was made, Sheridan arrived, and late in the day the Union army, in turn, routed the Rebels, who were now too feeble to again assume the offensive. Grant ordered Sheridan to lay waste the fertile

Shenandoah Valley, so that the Rebel army should have nothing to live on.

392. On the 30th of July, a detachment of cavalry penetrated into Pennsylvania, and, upon the refusal of the inhabitants of Chambersburg to pay $500,000, set fire to the town, destroyed $4,000,000 of property, and desolated the homes of 2,500 of the citizens.

393. The battle of Resaca was fought on the 14th and 15th of May, 1864. General Johnston commanded the Rebels; General Sherman, the Union troops. The Rebels were sorely defeated in this hard-fought battle.

394. General Hood made three furious assaults on the Union army, July 20th, 22d, and 28th. These were not successful, for Sherman swung round, got between Hood and Atlanta, and occupied that city September 2d.

395. The battle of Franklin was fought November 30th, 1864. At this place the Rebel General Hood met a severe repulse, in which he lost many officers.

396. After a fortnight of preparation, the Rebels under General Hood, were suddenly attacked by Thomas, December 15th, and severely handled. The action was renewed the next day, when Thomas won a victory. Hood had to retreat, and, being pursued by Thomas, his army suffered so terribly that it was never good for much after this.

397. Sherman started from Atlanta in the middle of November. He cut a wide swath of desolation through the South, and in less than a month reached the sea, near Savannah. The only obstacle, Fort McAllister, was taken by assault. This done, the Union army was put in communication with the Union fleet of the coast. Fort McAllister was taken December 13th; Savannah, December 21st. This ended Sherman's campaign of 1864.

398. General Banks, in March, led an expedition from New Orleans into the Red River country, Louisiana. He was aided by a fleet under Admiral Porter. Two actions were fought; the first, Sabine Cross Roads, April 8th, be-

ing a Rebel victory; and the second, Pleasant Hill, indecisive. The expedition was given up.

399. The Rebel General Forrest made a merciless raid through Tennessee, and appeared before Fort Pillow on the 12th of April. He attacked and captured Fort Pillow, which had a garrison mostly composed of negro troops. A large number of them were massacred.

400. A band of raiders from Canada appeared in the town. Entering the banks, they overpowered the owners, robbed the safes, and, rushing to the livery-stables, seized horses and made off for Canada before the inhabitants could recover from their surprise. The entire raid was accomplished in the space of half an hour.

401. On the night of the 25th of November, 1864, an attempt was made by Rebel emissaries to fire the city of New York, by saturating beds in the principal hotels with a mixture of phosphorus and oil. The wicked device was providentially discovered and brought to naught.

402. The Alabama was a British steamer, built in England, but officered and commissioned by the Rebel government. Her purpose was to prey upon Union commerce. She, alone, captured or destroyed sixty-five vessels. Her commander was Captain Semmes.

403. The encounter took place June 19th, 1864, in the English Channel, about seven miles off the French coast, at Cherbourg, between the United States steamer Kearsarge, Captain Winslow commanding, and the cruiser Alabama, under Captain Semmes. The two vessels were pretty evenly matched. In less than an hour the fire from the Kearsarge had reduced the Alabama to a sinking condition. At ten minutes past twelve, Captain Semmes struck his flag, having first ordered his crew to jump overboard, and sent a boat to ask assistance in saving his officers and men. The boats of an English yacht rescued about forty of the crew, including Captain Semmes, and landed them on the English coast.

404. It was the destruction of the Rebel iron-clad Al-

bemarle, at Plymouth, North Carolina. This was accomplished by Lieutenant Cushing, who fastened a torpedo to the Albemarle, which exploded and sunk her.

405. As the war went on, gold began to command a premium; that is, greenbacks began to depreciate. In 1864, gold rose as high as $2.80.

406. It was the capture of Fort Fisher by the Federals, January 14th and 15th, 1865.

407. Columbia was surrendered February 17th, 1865, to General Sherman. This move also compelled the Rebels to evacuate Charleston, February 17th.

408. The spring campaign of 1865, in Virginia, was opened by Sheridan. With a strong cavalry column he rode through the Shenandoah Valley, capturing most of the remnants of Early's force. He also swept down to the James River, where he destroyed the canal and tore up the railroads, and joined the Army of the Potomac, near Petersburg, March 26th.

409. Lee planned an assault on the Union lines. This assault was made March 25th, and resulted in the capture of Fort Steadman. But the Rebels were soon driven out.

410. The battle of Five Forks was fought April 1st, 1865. The Rebels were defeated.

411. An attack was made along the whole line of the works in front of Petersburg, April 2d. The line was carried at several points. During the night Lee abandoned Petersburg and Richmond, which were entered by the Union army April 3d.

412. Lee, with his diminished army, retreated westward. His hope was to join Johnston, in North Carolina. A hot pursuit was immediately begun by the forces of Grant, and several partial engagements were fought during the long race.

413. Johnston surrendered to Sherman at Raleigh, North Carolina, April 26th, 1865, and Lee to Grant April 9th, 1865, at Appomattox Court House.

414. The assassination of President Lincoln. He was

assassinated in the theatre at Washington, on the evening of April 14th, 1865. The man who did the deed was a very desperate character, named John Wilkes Booth. Mr. Lincoln died the next morning. His assassinator fled into Maryland, but was overtaken and shot by Boston Corbett one of his pursuers.

415. On the same night on which Mr. Lincoln was shot, Secretary Seward was stabbed while lying ill in bed at Washington. Booth, and the persons who assailed Mr. Seward, formed a band of desperadoes and conspirators. Several of them were afterwards hanged.

416. The war lasted four years.

417. Jefferson Davis was captured by a party of Union troops, in Georgia, May 10th, 1865, and was carried to Fortress Monroe, where he was kept a prisoner for a long time, but was finally released.

418. The total number of troops called for was 2,942,748. The total number obtained was 2,690,401.

419. The national debt at the end of the war was over $2,749,000,000. The expenditures of the government were enormous. In 1864 and 1865 they amounted to over $3,500,000 per day. The disbursements of the government during the last year of the war were more than the whole that was expended from the inauguration of Washington to the inauguration of Buchanan.

420. On the Union side it is estimated that 300,000 were either killed in battle, or died from disease in the field. It is estimated that 400,000 more were crippled or disabled for life. It would be a low estimate to say that, on both sides, over 1,000,000 of men were either killed or received wounds.

421. The death of Mr. Lincoln made Vice-President Andrew Johnson, of Tennessee, President of the United States. He was inaugurated the day of Mr. Lincoln's death, April 15th, 1865.

422. President Johnson issued a Proclamation of Am-

nesty to all persons who had been engaged in the Secession War, except to certain specified classes.

423. The exercise of the veto power.

424. The Freedman's Bureau, the Civil Rights, and the Tenure of Office Bills.

425. The first provides for the establishment of a department for the care and defence of the freedmen. The Civil Rights Bill guarantees to the negroes the rights of citizenship. The Tenure of Office Bill said that all civil officers whose appointment by the President required the consent of the Senate, should not be removed from office without the Senate's permission.

426. On January 24th, 1868, the House of Representatives brought in articles of *impeachment*, charging the President with violating the Tenure of Office Act, and with other misdemeanors. After a long trial before the Senate, President Johnson was acquitted, a two-thirds majority necessary for conviction, lacking one vote.

427. In March, 1867, by a treaty made with the Russian government, the United States acquired the territory of Alaska. The sum paid was $7,200,000 in gold.

428. At the close of the war, Secretary Seward demanded of Napoleon that the French troops should be withdrawn from Mexico. Napoleon considered it best to do this. The Mexicans then arose against Maximilian and his retainers, and conquered them. The result was that Maximilian was shot, in June, 1867. This invasion of Mexico was in opposition to the "Monroe Doctrine."

429. President Grant was inaugurated March 4th, 1869.

430. He was in harmony with the Republican party, and the contest between the two branches of the government was now at an end. Consequently both North and South looked forward to a better state of things.

431. Grant proclaimed a general amnesty to all connected with the civil war.

432. The Atlantic Cable was completed in June, 1866. In the year 1857–8, a cable was laid between Newfound-

land and Ireland by the Atlantic Telegraph Company, of which Mr. Cyrus W. Field was the president. The cable worked for a brief period, and then failed. In 1866, another cable was laid under the superintendence of Mr. Field, and this has ever since been in perfect working order.

433. The first steamboat applied to practical uses was constructed by an American, and sailed upon American waters. This was the Clermont, built by Robert Fulton. She began her trips on the Hudson River September 4th, 1807—a date far more memorable than that of any battle that was ever fought on earth.

434. The Union Pacific Railroad, a great work in which the government assisted, was completed in May, 1869, and is a wonder far more striking than all the old "seven wonders of the world." The brief period of six days now serves to transport one from the Atlantic seaboard to the shores of the Pacific, a distance of 3,600 miles.

435. The difficulty with England at this time was caused by the refusal of the English government to pay the damages to American commerce caused by the cruise of the Alabama. It was settled by arbitration; and in September, 1873, the English government payed into the United States treasury the sum of $15,500,000.

436. Among *historians* may be named, Prescott, Bancroft, and Motley.

437. Among *poets* may be named, Bryant, Whittier, Simms, Holmes, Poe, and Longfellow.

438. Among *romance and miscellaneous writers* may be named, Cooper, Hawthorne, Irving, Channing, and Legare.

439. Among *orators* may be named, Clay, Calhoun, Webster, Benton, Everett, Seward, Phillips, Prentiss, Douglas, Choate, and Stephens.

440. The great *civil war*, though terrible in its effects, has not been without some good results. One benefit of the war is, that it has brought the two sections, North and

South, to understand each other better, and respect each other more than they ever did before. It has also made Americans less puffed up and sensational than formerly, and has given a more earnest and manly cast to the American character.

441. The Republic of Santo Domingo, comprising a large part of the Island of Hayti, applied for admission to the United States in 1870. A commission of eminent men, appointed by the President to visit the island and examine its condition, reported favorably. The measure, however, was rejected by Congress.

442. A great fire broke out in Chicago Sunday night, October 8th, 1871. For two days it raged with tremendous violence, devastating about 3,000 acres; 25,000 buildings were burned, $200,000,000 worth of property was destroyed, and 100,000 persons were rendered homeless. About the same time with this disaster, extensive conflagrations raged in the forests of Wisconsin, Minnesota, and Michigan. Entire villages were consumed; 1,500 people perished in Wisconsin alone. An extensive fire occurred in Boston, November 9th, 1872. It swept over 60 acres in the center of the wholesale trade of that city, and destroyed $70,000,000 worth of property.

443. The Indian War along the Southwest having increased to such dimensions as to demand active measures for its suppression, General Sheridan was ordered thither. Black Kettle and a large body of his warriors being surprised and slain by a charge of Custer's cavalry (1868) in the battle of the Wacheta, hostilities ceased.

444. The Fenians, a secret society organized for the purpose of delivering Ireland from British rule, crossed the Canadian frontier at Buffalo, New York, and St. Albans, Vermont, in large numbers. President Johnson issued a proclamation declaring the movement a violation of our neutrality, and sent thither General Meade to execute the laws. After some skirmishing with the British troops, the expedition returned.

445. An embassy from the Celestial Empire, under charge of Anson Burlingame, visited the United States. It was an event of much importance, and the first of its kind in the history of that exclusive nation. A treaty was perfected, guaranteeing liberty of conscience to Americans in China, and certain commercial privileges of great value.

446. The Modoc Indians having refused to stay upon their reservation in Oregon, troops were sent against them. The savages thereupon retreated to their fastnesses in the Lava Beds. The peace commissioners, hoping to arrange the difficulty, held a conference with the chiefs. In the midst of the council, the Indians treacherously slew General Canby and Rev. Dr. Thomas and wounded Mr. Meachem. The Modocs were then bombarded in their stronghold, and finally forced to surrender. Captain Jack, and several of the leaders of the band, were executed at Fort Klamath, October 3d, 1873.

447. The Credit Mobilier was a company organized for the purpose of building the Pacific Railroad. The undertaking proved a profitable one, and enormous dividends were paid. An investigation developed the startling fact that various high officers of the government had accepted presents of stock, the value of which necessarily depended largely upon their official action. This occurred in 1873.

448. In the autumn of 1873, Jay Cooke & Co., bankers, of Philadelphia, having engaged too extensively in railroad schemes, failed. A financial crisis ensued. Hundreds of prominent firms all over the Union were involved in ruin. A settled stringency of the money market and stagnation of business followed.

449. In 1868 Cuba attempted to throw off the Spanish yoke. Great sympathy was felt in the United States with the patriots, and repeated efforts were made to send them aid. In spite of the vigilance of the authorities, the Virginius, loaded with men and and supplies, escaped from port in the fall of this year. While still on the high seas, and flying the American flag, she was captured by the

Spanish war steamer Tornado and carried into Santiago. Many of her crew and passengers were summarily shot. The United States consul at that port protested in vain. President Grant interfered with a strong hand. The Virginius was thereupon released, and suitable apologies were made for the insult offered to the United States flag.

450. Political difficulties occurred in more than one of the Southern States during the time of Grant's administration. In Louisiana, the struggle between parties for the control of the state was severe and protracted for several years. In 1873, two returning-boards, each claiming to be the legal one, reported two different governors as elected —the one a Republican, the other a Democrat. There was, of course, an immediate conflict of authority, resulting in temporary anarchy. Kellogg, the Republican incumbent, was sustained by the President, but was looked upon by the opposite party as having no rightful claim to the position.

451. Violent demonstrations were repressed for the time, but broke out in New Orleans in the fall of 1874. Twenty-six persons lost their lives in a street-conflict, and Governor Kellogg was obliged to seek safety in the Custom-House under the protection of the Federal flag. Again the President interposed in Kellogg's favor. The following January, another outbreak occurred, and a committee of the House of Representatives was sent to New Orleans for its adjustment.

452. At the election held in the fall of 1876, the controversy before alluded to was renewed with increased bitterness. Fraud was charged upon each party by its opponents, and again there were two rival Governors and Legislatures. President Grant now declined to interfere any further in the affairs of the state than was necessary to prevent a breach of the peace. His successor, into whose administration the struggle was prolonged, withdrew the Federal troops which had up to this time prevented the

overthrow of the Republican government, and the Democratic incumbent quietly assumed undisputed control.

453. A similar conflict between parties agitated South Carolina; it was similarly disposed of by the President in 1877, and with the like result.

454. A business depression, of all kinds, paralyzed the industries of the nation in 1873 and for several years immediately following. It was the natural result of the war, and was attended with ruin to hundreds of commercial and manufacturing establishments, as well as with great distress to the laboring-classes. The revulsions of 1837 and 1857 were neither so far-reaching nor so long continued. Not till 1877 did the clouds in any degree seem to lift. Then there was a slight improvement, and with the blessing of Heaven on the efforts of the people, now taught the necessity of prudence, economy, and unremitting industry, it was hoped that the country would soon recover its wonted prosperity.

455. Yes; different measures had been proposed. "Inflationists" had advocated an increased issue of paper money; others spurned "the rag baby," as they called it, insisted that inflation would but put off the evil day, and called for a contraction of the currency and a speedy return to specie payments. A majority in Congress favored the latter view, and early in 1875 a bill was passed fixing January 1st, 1879, as the day when specie payments should be resumed.

456. Among them were William H. Seward, who had ably managed the foreign relations of the country during Lincoln's administration, 1872; Morse, the inventor of the magnetic telegraph, 1872; Chief-Justice Chase, who had skillfully provided ways and means during the trying days of the civil war, 1873; Charles Sumner, of Massachusetts, a leader in the United States Senate, 1874; Horace Greely, highly distinguished by both Republican and Democratic parties, also long prominent in the country as the conduc-

tor of the New York Tribune, 1872; and Vice-President Wilson, 1875.

457. The crowning celebration of the year 1876, was a great International Exhibition, opened at Philadelphia on the 10th of May, the grandest "world's fair" the world had ever seen. The inclosed grounds covered an area of 236 acres, and contained 200 buildings, some of them of great magnitude. All nations contributed of their productions and were represented by visitors, the admissions during the six months that the exhibition remained open falling little short of 10,000,000.

458. A hostile disposition was manifested early in 1876 by the Sioux in Dakota, Montana, and Wyoming. They refused to settle upon a reservation, and attacked friendly Indians under the protection of the United States. It was necessary to reduce them by force. In June, General Custer, with a part of his regiment, came upon the hostile Sioux, 2,500 strong, near the Little Big Horn River, and without waiting for support dashed upon them. His whole force was overwhelmed and destroyed, Custer himself being slain while fighting gallantly. A brave who was in the battle afterward related how "the White Chief," when his comrades had all fallen and his firearms were emptied, undauntedly defended himself with his sword, until a bullet laid him in the dust. The Federal army, re-enforced, subsequently pursued and broke up the Sioux, and compelled most of them to surrender.

459. The election of 1876 was unusually exciting. The candidates were, on the Republican side, Governor Rutherford B. Hayes, of Ohio, and William A. Wheeler, of New York; on the Democratic, Governor Samuel J. Tilden, of New York, and Governor Thomas A. Hendricks, of Indiana. The contest was close, and the issue for some time doubtful; charges were made of fraud on the one side and intimidation on the other. From several of the states two opposing certificates were handed in. The trouble was finally settled by the passage of an act of Congress referring

all disputed certificates to a commission, consisting of five Senators, five Representatives, and five Judges of the Supreme Court of the United States.

460. The result was that Hayes and Wheeler were declared to have received one more electoral vote than their opponents; and, accordingly, they were inaugurated on the 5th of March, 1877.

461. The summer of 1877 was memorable for a great railroad strike, which, commencing among the employes of the Baltimore and Ohio Company on the 16th of July, rapidly extended northward to Canada and as far west as the Mississippi. The depresssion in business having necessitated a general reduction of wages, to which the men were unwilling to submit, they quit work on the different roads as the news of the commencement of the strike reached them, prevented new hands by threats and violence from taking their places, and announced that neither freight nor passenger trains would be allowed to run.

462. The movement soon became so formidable, particularly in West Virginia, Maryland, and Pennsylvania, that the militia were unable to cope with it, and the Federal government was appealed to for aid in protecting the rights and property of the railroad companies. At Pittsburgh a collision took place between the state troops and the rioters, which resulted in the destruction of many lives and $6,000,000 worth of property—cars, locomotives, machine-shops, depots, and large quantities of freight, being burned by the mob, who controlled the city for two days. Riots also occurred at St. Louis, Chicago, Reading, and Scranton, Pennsylvania, and other cities. Three weeks elapsed before, with the aid of such national troops as could be gathered, order was fully restored, and the regular running of trains on all the roads was resumed.

463. The 46th Congress met December 6th, 1880, for its third and last session. President Hayes' message recommended treasury and land grants to promote free educa-

tion; a new Civil Service Commission; a law defining the relations of Congressmen to appointments to office; the suspension of the silver coinage act; repeal of the Tenure of Office act; the government of Utah by a commission with prohibition of suffrage or office to polygamists; and the creation of the office of Captain General of the army for General Grant.

464. President Hayes vetoed the Funding Bill, which funded about $700,000,000 of the public debt at three per cent., having passed the House January 19th, and the Senate February 18th, 1881, with amendment changing the bonds to twenty years, redeemable after five years, instead of a 5–10 bond.

465. James A. Garfield was publicly inaugurated President of the United States March 4th, 1881.

466. Garfield's address strongly urged universal education; regulation and improvement of the civil service by law; thorough protection to the suffrage for both races and in all the states alike; and the reform of the coinage, giving it full value in all the markets of the world.

467. Garfield's Cabinet was as follows: James G. Blaine, of Maine, Secretary of State; William Windom, of Minnesota, Secretary of Treasury; Robert T. Lincoln, of Illinois, Secretary of War; William H. Hunt, of Louisiana, Secretary of Navy; Samuel J. Kirkwood, of Iowa, Secretary of Interior; Thomas L. James, of New York, Postmaster General; Wayne McVeagh, of Pennsylvania, Attorney General.

468. President Garfield, with other important nominations, named William H. Robertson collector of customs at New York.

469. On April 11th, 1881, Secretary Windom began refunding by offering to pay July 1st, United States bonds $336,235,050 with option of exchanging for new bonds at 3½ per cent.

470. President Garfield withdrew from the Senate, May

4th, 1881, the New York nominations, except that of Judge Robertson to be collector, which was confirmed May 18th.

471. Senators Roscoe Conklin and Thomas C. Platt resigned their seats as United States Senators from New York, because of the nomination and certain confirmation of Collector Robertson.

472. On May 5th the United States Senate confirmed Chinese Immigration and commercial treaty; also treaties with Columbia and Japan.

473. On May 20th the Senate of the United States adjourned, having been in session since March 5th. A protracted deadlock arose over the Senate offices, the Republicans seeking to remove, and the Democrats seeking to retain, the Secretary, Sergeant-at-Arms, etc. The control of the Senate committees, which had been organized by the Democrats early in the session, was changed to the Republicans by the aid of Senator Mahone, of Virginia.

474. The assassination of President Garfield. He was shot at the Baltimore and Potomac Railroad depot, Washington, D. C., by a disappointed office-seeker—an egotistical and cowardly brute—named Charles J. Guiteau. The criminal was quickly arrested and lodged in jail. As soon as possible the President was conveyed to the White House amid immense throngs of excited citizens. Though a fatal result was momentarily expected, he rallied and lived nearly three months.

475. The death of President Garfield occurred at 10:35 P. M., September 19th, 1881, at Elberon, New Jersey, where he had been removed with earnest hopes of bettering his condition.

476. On September 4th, the great forest fires began burning in Michigan, spreading over a large part of three counties, destroying many villages, and over 300 lives.

477. Vice-President Chester A. Arthur. He took the oath of office as President of the United States at his house in New York city at about 2:00 A. M., September 20th, 1881.

478. President Arthur was formally sworn into office September 22d, at Washington, by the Chief Justice at the Capitol, and gave a brief inaugural address.

479. On September 26th, 1881, the funeral of President Garfield was attended by a vast concourse of people at Cleveland, Ohio, where his remains were placed in Lake View Cemetery.

480. On October 10th, the Senate of the United States met in special session, convened by proclamation of President Arthur, September 23d. Senator Bayard, of Delaware, a Democrat, was elected President of the Senate.

481. Senator David Davis, of Illinois, Independent, was elected President of the Senate *pro tem.*, on October 13th, in place of Senator Bayard, through the seating of Messrs. Lapham and Miller, New York Senators.

482. The trial of Charles J. Guiteau for the murder of President Garfield began in the Supreme Court of the District of Columbia, on November 14th, 1881, Judge Cox presiding. After a long and exciting trial, lasting nearly two and one-half months, a verdict of guilt was found against the prisoner, January 25th, 1882, and he was sentenced by Judge Cox to be hung on June 30th, following.

483. (1.) On December 17th, 1880, the Educational Bill passed Senate, funding proceeds of public land sales and Patent Office earnings at four per cent., dividing the interest among the States in proportion to illiteracy. (2.) The electric light on the Brush system successfully applied to street lighting for nearly a mile of Broadway, New York, on December 20th. (3.) The British Admiralty decided to abolish flogging in the navy, December 8th. (4.) The trial of Charles S. Parnell, etc., commenced in Dublin, December, 28th. (5.) On January 6th, 1881, the British Parliament opened. The Queen's speech asked for additional powers to suppress agrarian crimes in Ireland. (6.) On January 23d, Callao and Lima, Peru, surrendered to the Chilians, virtually ending the South American war. (7.) On January 24th, Mr. Foster moved in Parliament a bill to protect life and

property in Ireland. The Home Rulers by disorderly opposition prevented the reading of the bill for forty-one hours prolonged session. The Speaker then arbitrarily declared debate closed, and the bill was read. (8.) The Czar of Russia, Alexander II, was assassinated March 13th, two bombs being thrown at him on returning from a parade. His eldest son succeeded to the empire, under the title of Alexander III. (9.) On April 15th, the five condemned Nihilists convicted of complicity in the Czar's assassination were hanged. (10.) John Dillon, M. P., from Tipperary, arrested in Ireland under the Coercion Act, May 2d. (11.) May 19th, New Testament Revision published in America; 200,000 copies sold in two days. (12.) On June 2d, Great Britain paid the United States £15,000, agreed compensation for Fortune Bay fishing damages. (13.) Indian Chief Sitting Bull surrendered at Fort Buford, July 20th. (14.) About 200 persons have been imprisoned in Ireland under the Coercion Act. Official returns give the number of families evicted in Ireland for three months up to June 30th, at 1,063. (15.) On October 13th, Mr. Charles S. Parnell was arrested and confined in Kilmainham jail. (16.) Celebration at Yorktown, October 18th, of the centenary of the surrender of Lord Cornwallis in 1781. French and German guests present; oration by Robert C. Winthrop; British flag saluted by order of President Arthur, and corner-stone of a monument laid.

484. Vermont was admitted into the Union March 4th, 1791.

485. Kentucky was admitted into the Union June 1st, 1792.

486. Tennessee was admitted into the Union June 1st, 1796.

487. Ohio was admitted into the Union Nov. 29th, 1802.

488. Louisiana was admitted into the Union April 8th, 1812.

489. Indiana was admitted into the Union Dec. 11th, 1816.

490. Mississippi was admitted into the Union Dec. 10th, 1817.

491. Illinois was admitted into the Union Dec. 3d, 1818.

492. Alabama was admitted into the Union Dec. 14th, 1819.

493. Maine was admitted into the Union March 15th, 1820.

494. Missouri was admitted into the Union Aug. 10th, 1821.

495. Arkansas was admitted into the Union June 15th, 1836.

496. Michigan was admitted into the Union Jan. 26th, 1837.

497. Florida was admitted into the Union March 3d, 1845.

498. Texas was admitted into the Union Dec. 27th, 1845.

499. Iowa was admitted into the Union Dec. 28th, 1846.

500. Wisconsin was admitted into the Union May 29th, 1848.

501. California was admitted into the Union Sept. 9th, 1850.

502. Minnesota was admitted into the Union May 11th, 1858.

503. Oregon was admitted into the Union Feb. 14th, 1859.

504. Kansas was admitted into the Union Jan. 29th, 1861.

505. West Virginia was admitted into the Union June 20th, 1863.

506. Nevada was admitted into the Union Oct. 31st, 1864.

507. Nebraska was admitted into the Union March 1st, 1867.

508. Colorado was admitted into the Union March 3d, 1876.

GRAMMAR.

QUESTIONS.

1. What is Language?
2. What is Grammar?
3. What is English Grammar?
4. Into how many parts is Grammar divided?
5. Of what does Orthography treat?
6. Of what does Etymology treat?
7. Of what does Syntax treat?
8. Of what does Prosody treat?
9. What is a letter?
10. What is a syllable?
11. What is a word?
12. What is a sentence?
13. What is a phrase?
14. What is a proposition?
15. What is a clause?
16. What is a thought?
17. How many parts of speech, and what are they?
18. What is the basis of Grammar?
19. What is spelling?
20. What is syllabication?

21. What words should begin with capital letters?
22. What is a noun, and how many kinds?
23. What is a proper noun? A common noun?
24. When does a proper noun become a common noun?
25. When does a common noun become proper?
26. What is a collective noun? Abstract? Verbal?
27. What are the accidents of nouns?
28. How many ways are there of distinguishing the sexes?
29. Name some of the nouns that are used only in the singular.
30. Name some that are used in the plural only.
31. What nouns are alike in both numbers?
32. When are proper names without a title used in the plural?
33. In forming the plurality of proper names, where the title is given, which should you pluralize—the name or title?
34. When several persons of the same name are spoken of individually, or when persons of different names are spoken of together, which should receive the plural—the title or name?
35. What is case, in Grammar?
36. What is an adjective?
37. Mention some of the ways in which the pronoun *it* is used.
38. What is a relative pronoun?
39. How many kinds of relative pronouns?
40. What are the simple relative pronouns?
41. What is the pronoun *who* applied to?
42. To what is *which* applied?
43. To what is *that* applied?
44. In what way is *what* used?
45. What are some of the compound relative pronouns?
46. What are pronominal adjectives?
47. What is a verb? Transitive? Intransitive?
48. What are tenses, and how many in English?

49. Describe the participial mood or participle.
50. How many participles have verbs?
51. How does the present active participle always end?
52. What does the past participle denote?
53. Describe the perfect participle.
54. Describe a participial adjective.
55. What is the conjugation of a verb?
56. How should a verb be parsed?
57. How are interrogative sentences made negative?
58. What is a defective verb?
59. What are impersonal verbs?
60. What is an adverb?
61. What is a conjunctive adverb?
62. How would you parse a preposition?
63. How would you parse an interjection?
64. How would you parse a conjunction?
65. What is parsing?
66. In how many ways can words be parsed, and what are the names?
67. What is etymological parsing?
68. What is syntactical parsing?
69. What is syntax?
70. What is a simple sentence?
71. What is a complex sentence?
72. What is a compound sentence?
73. What can be said of the subject of a proposition?
74. What is the grammatical subject?
75. What is the logical subject?
76. How are the members of a compound sentence connected?
77. The rules of syntax may be referred to how many heads?
78. What is concord?
79, What is position?
80. What is government?
81. The meaning of a sentence often depends upon what?

82. When is *as* a relative pronoun? When is *that* a relative pronoun?

83. How should *either*, *neither*, *each other* and *one another* be used?

84. When are objects personified?

85. In personified objects, when is the masculine gender preferred?

86. When is the feminine gender preferred?

87. When is a collective noun singular? When plural?

88. When are two terms in apposition?

89. When is one term predicated by the other?

90. How can the possessive case be expressed without the apostrophe?

91. When may *that* have two cases?

92. How are the articles *the*, *a*, and *an* used?

93. When should *a* be used?

94. When should *an* be used?

95. When should *more* and *most* in comparison be preferred?

96. How many tenses in each of the modes?

97. When the subject consists of words differing in person, how is the form of the verb or pronoun determined?

98. When is it proper to use *shall* and *should?*

99. When is it proper to use *will* and *would?*

100. What is the conjugation of a verb?

101. What is the synopsis of a verb?

102. How can we ascertain to what class adverbs belong?

103. When does a preposition become an adverb?

104. What is a paragraph?

105. What part of a sentence is considered the most important?

106. In what do all the errors of language consist?

107. In the analysis of phrases, what forms are given?

108. What kinds of words are connectives?

109. What parts of speech are never modified?

110. By what may a verb be modified?

111. What is a figure, in Grammar?

112. How many kinds of figures in Grammar?

113. How many, and what are the names of the most important, figures of etymology?

114. What is aphæresis?

115. What is prosthesis?

116. What is syncope?

117. What is apocope?

118. What is paragoge?

119. What is diæresis?

120. What is synæresis?

121. What is tmesis?

122. What is a figure of syntax?

123. What are the most important figures of syntax?

124. What is ellipsis?

125. What is pleonasm?

126. What is syllepsis?

127, What is enallage?

128. What is hyperbaton?

129. What is a figure of rhetoric?

130. What are the most important figures of rhetoric?

131. What is personification?

132. What is a simile?

133. What is a metaphor?

134. What is an allegory?

135. What is vision or imagery?

136. What is an hyperbole?

137. What is irony?

138. What is metonymy?

139. What is synecdoche?

140. What is antithesis?

141. What is climax?

142. What is exclamation?

143. What is interrogation?

144. What is paralepsis?

145. What is apostrophe?

146. What is versification?

147. What is a verse?

148. Verse is of how many kinds?
149. What is rhyme?
150. What is blank verse?
151. What is a foot, in poetry?
152. What are the principal feet, in English?
153. Describe the iambus.
154. Describe the trochee.
155. Describe the anapæst.
156. Describe the dactyl.
157. What is scanning, in poetry?
158. Correct the following sentences: "Those sort of people."
159. "Who did he visit?"
160. "I don't want no aid."
161. "He said how he should come."
162. "Are them your books?"
163. "You should speak prompt."
164. "The boy he did it."
165, "Let every one attend to *their* work."
166. "The hawk who caught the jay."
167. "The carpenter *which* built the house."
168. "Who did you see?"
169. "Where was you?"
170. "Each of his brothers are well."
171. "It is me, sir."
172. "*You* and *me* will go together."
173. "I have not written, and I do not intend to."
174. "It is her."
175. "He is the most unhappiest man I ever saw."
176. "The king conferred on him the title of a duke."
177. "He is a man of wealth, and of character, and of influence."
178. "What prevented him going?"
179. "He is beloved for his honesty and goodness."
180. "Hope to see you soon."
181. "We had some nice lattice and sparrow-grass for dinner."

182. "I seen him yesterday." "I have saw an old friend to-day."

183. "The truth is, that error and truth are blended in their minds."

184. He failed fulfilling his promise."

185. "He was retired from active service."

186. "What did you say her name was?"

187. "If you will go, I will pay thy expenses."

188. "The country looks beautifully after a shower."

189. "I am tolerable well, I thank you."

190. "I shall go; no one will prevent me."

191. "I should be sorry if you would be sick."

192. "You is the second person."

193. "If a boy deceives his father, *he* will regret it."

194. "The noun James is the actor."

195. This is a apple."

196. "He is the wisest of the two." "He is the wiser of them all."

197. "He is called the captain."

198. "He is a better teacher than a poet."

199. "The apple tastes sweetly."

200. "I shall not change my course of action, whether you do or no."

201. Frank, and James and John are studying."

202. "Not only was he poor, but idle."

203. "I saw him entering the gate and ring the bell."

204. "That is different to what I expected."

205. "My brother is older than me."

206. "It was your duty to have warned him."

207. "He went for to see."

208. "Between you and I."

209. "Me did it, my kind friend."

210. "I knew it to be he."

GRAMMAR.

ANSWERS.

1. Language is the expression of thought by means of spoken or written words.

2. Grammar treats of the laws of language, and the right method of using it.

3. English Grammar is the art of speaking and writing the English language with propriety.

4. Grammar is divided into four parts: Orthography, Etymology, Syntax and Prosody.

5. Orthography treats of the forms of letters, and teaches us how to write correctly.

6. Etymology treats of the different parts of speech, with their derivation and modifications.

7. Syntax treats of the relation, agreement, government and arrangement of words in sentences.

8. Prosody treats of figures, versification, utterance, and punctuation.

9. A letter is a mark, or character, used to represent an elementary sound of the human voice.

10. A syllable is a letter, or a combination of letters, representing a sound, uttered with one impulse of the voice.

11. A word is an articulate sound used by common consent as the sign of an idea.

12. A sentence is a thought expressed by a proposition or a union of propositions, followed by a full pause.

13. A phrase is two or more words rightly put together without making an entire proposition.

14. A proposition is a subject combined with its predicate.

15. A clause is a portion of a sentence containing a subject and its predicate.

16. A thought is the act of thinking; the exercise of the mind in any way except sense and perception; reflection.

17. There are nine, viz.: Noun, pronoun, verb, article, adjective, adverb, preposition, interjection and conjunction.

18. The basis of Grammar, or the test of correctness, is the usage of the best writers and speakers.

19. Spelling is the art of expressing words by their right letters properly arranged. This art must be learned chiefly from spelling-books, dictionaries, and by observation in reading.

20. Syllabication is the division of words into syllables.

21. The first word of every book, chapter, letter, or note; the first word after a period; also, after a mark of interrogation or exclamation, when the sentence before, and the one after it, are independent of each other; proper names, titles of office or honor; the letters I and O; the first word of every line of poetry; every word denoting the Deity; adjectives derived from the proper names of places; the first word of a direct quotation; common nouns when personified; and, generally, all words which are used in specialized sense, should each commence with a capital letter.

22. A noun is the name of any person, place, or thing, when used in connection with other words. There are two kinds—proper and common.

23. A proper noun is a name that distinguishes a par-

ticular one from the rest of a class. A common noun is a name applied to all things of the same sort.

24. When it is used to denote a whole class; as, "He is the Cicero of his age," "The twelve Cæsars."

25. When personified, and also when used as proper names; as, "Hail, Liberty!" "The Park."

26. Collective nouns are those which signify many in the singular number; as, *army*, *people*. An abstract noun is the name of an attribute which the mind conceives apart, or abstracted from, its object; as, *whiteness*, *sleep*, *wisdom*. Verbal nouns are the names of actions· as, *reading*, *writing*, etc.

27. The accidents of nouns are person, gender, number, and case.

28. There are three: 1. By different words; as, *father*, *mother*. 2. By difference of termination; as, *actor*, *actress*. 3. By prefixing a distinguishing word; as *servant*, *a man servant*.

29. Such are the names of metals, virtues, vices. arts, sciences, abstract qualities, and things weighed or measured; as, *gold*, *meekness*, *piety*, *idleness*, *intemperance*, *sculpture*, *geometry*, *wisdom*, etc.

30. Such are the names; as, *annals*, *antipodes*, *archives*, *ashes*, *bitters*, *billiards*, *clothes*, *dregs*, *hysterics*, *manners*, *morals*, *tidings*, *thanks*, etc.

31. Such are the names; as, *deer*, *sheep*, *swine*, *vermin*, *grouse*, *salmon*, *tench*, *trout*, *apparatus*, *series*, *species*, etc.

32. When they refer to a race or family; as, "The Campbells," "The Stuarts."

33. Pluralize the name, and not the title; as, "The Mrs. Howards," "The two Miss Mortons."

34. The title only, and not the name, is made plural; as, "Misses Julia and Mary Robinson," "Messrs. Jones, Brown and Robinson."

35. Case is the state or condition of a noun with respect to the other words in a sentence.

36. An adjective is a word used to limit or qualify the meaning of a noun or pronoun.

37. *It* is used instead of a neuter noun; as, "Life is short; it should be well improved." *It* is used as an indefinate subject of the verb *to be*, followed by a predicate in any person or number; as, "It is I," "It is you," "It is they," etc. *It* is used indefinitely before certain verbs, to denote some cause unknown, or general, or well known, whose action is expressed by the verb; as, "It rains," "It is cold," etc. *It* is sometimes used as a mere expletive; as, "Come and trip it as you go."

38. A relative pronoun is one that relates to, and connects its clause with, a noun or pronoun before it. The word to which it relates is called the antecedent; as, "The master who taught us."

39. There are two kinds—simple and compound.

40. The simple relative pronouns are *who*, *which*, *that* and *what*.

41. *Who* is applied to persons only; as, "The boy who reads."

42. *Which* is applied to inferior animals, and things without life; as, "The dog which barks," "The book which was lost."

43. *That* is applied to both persons and things; as, "The boy that reads," "The book that was lost."

44. *What* is applied to things only, and is never used but when the antecedent is omitted; as, "This is what I wanted."

45. The relatives *who*, *which* and *what*, with *ever* or *soever* annexed, are called compound relatives.

46. Pronominal adjectives are those which, without the use of the article, may represent a noun when understood; as, "This (book) is mine; that is yours."

47. A verb is a word used to express the act, being or state of its subject; as, "John runs," "The boy sleeps." Transitive verbs are those that have objects, or require them to complete their sense; as, "James strikes the table."

Intransitive verbs are those that do not require objects to complete their sense; as, "He sleeps," "You run."

48. Tenses are certain forms of the verb which serve to point out the distinctions of time. The tenses in English are six—the present, the present-perfect, the past, the past-perfect, the future, and the future-perfect.

49. The participial mood, or participle, expresses the action or state of the verb, not assertively but attributively. It has also the character of the adjective, and as such qualifies its subject; as, "The man came seeing," "Having finished our task, we may play."

50. Verbs have three participles—the present, the past, and the perfect; as, *loving*, *loved*, *having loved*, in the active voice; and, *being loved*, *loved*, *having been loved*, in the passive.

51. It always ends in *ing*. In all verbs it has an active signification, and denotes an action or state as continuing and progressive; as, "James is building a house." In some verbs it has also a passive progressive signification; as, "The house is building."

52. It denotes an action or state as completed: Active—"He has concealed a dagger under his cloak;" passive—"He has a dagger concealed under his cloak."

53. The perfect participle is always compound, and represents an action or state as completed at the time referred to: Active—"Having finished our task, we may play;" passive—"Our task having been finished, we may play."

54. The present participle active, and the past participle passive, when separated from the idea of time, become adjectives, and are called participle adjectives; as, "An amusing story," "A bound book."

55. The conjugation of a verb is the regular combination and arrangement of its several voices, moods, tenses, numbers, and persons.

56. A verb should be parsed by stating its class (transitive, intransitive, or attributive), its form (regular or irreg-

ular), conjugating it if irregular, and stating its tense, mood, voice, the subject of which it affirms, and its person and number; thus, "He is wise"—*is* is a verb, attributive, irregular—am, being, was, been—found in the present, indicative, and affirms the attribute *wise*, of its subject *he*, in the third person, singular.

57. Interrogative sentences are made negative by placing the negative either before or after the nominative; as, "Do I not love?" or, "Do not I love?"

58. A defective verb is one in which some of the parts are wanting.

59. Impersonal verbs are those which assert the existence of some action or state, but refer to no particular subject. They are always in the third person, singular; and, in English, are preceded by the pronoun *it;* as, "It rains," "It hails," etc.

60. An adverb is a word used to modify a verb, an adjective, or another adverb, or to denote some circumstance respecting it; as, "Ann speaks *distinctly*."

61. A conjunctive adverb is one that stands for two adjuncts, one of which contains a relative pronoun, and the other its antecedent; as, "I will see you *when* you come."

62. A preposition is parsed by stating what part of speech, and between what words it shows the relation; thus, "The waters of Jordan"—*of* is a preposition and shows the relation between Jordan and waters.

63. An interjection is parsed by stating the part of speech, why, and the emotion expressed; as, "Oh! what a sight is here."

64. A conjunction is parsed by stating the part of speech, its class, sub-class, and the words, phrases, or sentences which it connects; as, "He *and* I must go; *but* you may stay."

65. Parsing is the resolving of a sentence into its elements or parts of speech.

66. Words can be parsed in two ways—etymologically and syntactically.

67. Etymological parsing consists in stating the part of speech to which each word in a sentence belongs, its uses and accidents, its inflection and changes, and derivation, if derived.

68. Syntactical parsing adds to the above a statement of the relation in which the words stand to each other, and the rules according to which they are combined in phrases and sentences.

69. Syntax is that part of Grammar which treats of the proper arrangement and connection of words in a sentence.

70. A simple sentence contains but one proposition; as, "The wind blows."

71. A complex sentence contains at least two propositions, one of which must be principal and the rest subordinate; as, "When the wind blows, the trees bend."

72. A compound sentence contains at least two principal propositions; as, "The winds blow, and the trees bend."

73. The subject of a proposition is either grammatical or logical.

74. The grammatical subject is the person or thing spoken of, unlimited by other words; as, "Knowledge is power."

75. The logical subject is the person or thing spoken of, together with all the words, phrases, or clauses by which it is limited or defined; thus, "Every man at his best state is vanity"—the grammatical subject is "man," the logical is "every man at his best state."

76. They are connected by such conjunctions as *and*, *or*, *nor*, *but*, *yet*, etc.

77. The rules of syntax may all be referred to three heads, viz.: Concord or agreement, government, and position.

78. Concord is the agreement which one word has with another, in gender, number, case, or person.

79. Position means the place which a word occupies in relation to other words in a sentence.

80. Government is the power which one word has in determining the mood, tense, or case of another word.

81. In the English language, which has but few inflections, the meaning of a sentence often depends much on the position of the words of which it consists.

82. *As* is a relative pronoun when preceded by *such*, *many*, or *same*, and relates to the objects thus specified. *That* is a relative pronoun when it is equal to *who*, *whom*, or *which*.

83. In speaking of two, *either*, *neither*, and *each other* should be used; but in speaking of more than two, *one another*.

84. When they are regarded as persons. Nouns thus used have gender by personification.

85. When the character of the object denotes size, power, or domineering qualities; as, "The sun seemed shorn of his beams."

86. When the character of the object is noted for beauty, amiability, productiveness, or submission; as "Soon peace shall come, with all her smiling train."

87. When the whole collection is regarded as one thing, it is singular, but plural when different collections are meant, or when it refers to the individuals composing the collection; as, *army*, *armies; congregation*, *congregations;* "Most people are eager to succeed."

88. When no verb joins the terms, the latter term is in apposition with the former; as, "Jones, the lawyer." These terms must agree in case.

89. When a verb joins the terms, one is predicated of the other; as, "He is governor."

90. By using *of*, or by making the possessive word an adjective; as, "The death of Homer," "Douglass Farm."

91. When it is a relative, and equal to *that which*.

92. *The* is used to point out a particular object or

class, while *a* or *an* is used to show that no particular one of a class is meant.

93. Whenever the next word begins with a consonant sound.

94. Whenever the next word begins with a vowel sound.

95. Usually with adjectives of more than two syllables, or those of two syllables that do not end in *le* or *y*.

96. There are six in the indicative; three in the subjunctive—the present, past, and past-perfect; four in the potential—the present, present-perfect, past, and past-perfect; the imperative has one—the present tense.

97. The first person is preferred to the second and the second to the third—"You, Frank, and I are devoted to our country." If the nominatives are taken separately, or connected by *or* or *nor*, the verb prefers the nominative next to it; as, "He or I am to blame."

98. When required to express a duty, command, determination, resolve; and in future propositions when the subject is of the first person, and no reference is made to the will of the subject.

99. When the expression is of willingness, or in future propositions when the subject is of the second or third person, and no compulsion required.

100. The regular arrangement of the modes, tenses, persons, and numbers, and participles of verbs.

101. An outline of its parts through the modes and tenses, in a single person and number.

102. Adverbs of time answer to the questions: *When? How long? How often?* Adverbs of place answer to the questions: *Where? Whence?* Adverbs of degree answer to the questions: *How much? To what extent? In what degree?* Adverbs of manner answer to the question: *How?*

103. When there is no word to govern; as, "The bird flew up, then around, then down again."

104. A paragraph is a sentence or combination of sen-

tences, completing a train of thought, and distinguished by a new beginning.

105. The beginning; the next most important is the end.

106. In the improper arrangement of words; in the use of improper words; in the omission of words, and the use of unnecessary words.

107. Simple, complex, compound, mixed, and prepositional.

108. Conjunctions, prepositions, relative pronouns, responsive pronouns, and the conjunctive adverbs.

109. Articles, prepositions, conjunctions, and interjections.

110. A verb may be modified by an object, a predicate adjective, an adverb, a participle, an infinitive, phrases and clauses.

111. A figure, in Grammar, is some deviation from the ordinary form, or construction, or application of words in a sentence, for the purpose of greater precision, variety, or elegance of expression.

112. There are three kinds of figures, viz.: Of etymology, of syntax, and of rhetoric. The first refers to the form of words, the second to their construction, and the last to their application.

113. There are eight, viz.: Aphæresis, prosthesis, syncope, apocope, paragoge, diæresis, synæresis, and tmesis.

114. Aphæresis is the elision of a syllable from the beginning of a word; as, *'gainst*, *'gan*, *'bove*, *'neath*, for *against*, *began*, *above*, *beneath*.

115. Prosthesis is the prefixing of a syllable to a word; as, *adown*, *agoing*, for *down*, *going*, etc.

116. Syncope is the elision of a letter or syllable, usually a short one from the middle of a word; as, *med'cine*, *sp'rit*, *e'en*, for *medicine*, *spirit*, *even*.

117. Apocope is the elision of a letter or syllable from the end of a word; as, *tho'* for *though*, *th'* for *the*,

118. Paragoge is the annexing of a syllable to the end of a word; as, *deary* for *dear*.

119. Diæresis is the division of two concurrent vowels into different syllables, usually marked thus (¨) on the second vowel; as, *coöperate*, *aërial*.

120. Synæresis is the joining of two syllables into one, in either orthography or pronunciation; as, *dost*, *scëst*, for *doest*, *seest*; or *loved*, *learned*, pronounced in one syllable instead of two—*lov-ed*, *learn-ed*.

121. Tmesis is the separating of the parts of a compound word by an intervening term; as, "What time soever," "On which side soever."

122. A figure of syntax is a deviation from the usual construction of words in a sentence, used for the sake of greater beauty or force.

123. The most important are: Ellipsis, pleonasm, syllepsis, enallage, and hyperbaton.

124. Ellipsis is the omission of a word or words necessary to the full construction of a sentence, but not necessary to convey the idea intended. Such words are said to be understood; as, "The men, women, and children," for "The men, *the* women, and *the* children."

125. Pleonasm is the using of more words than are necessary to the full construction of a sentence, to give greater force or emphasis to the expression; as, "The *boy*, oh! where was *he*?"

126. Syllepsis is an inferior species of personification, by which we conceive the sense of words otherwise than the words import, and construe them according to the sense conceived; thus, of the sun we say, "*He* shines;" of a ship, "*She* sails."

127. Enallage is the use of one part of speech for another, or of one modification of a word for another, as an adjective for an adverb; thus, "They fall *successive*, and *successive* rise," for *successively*; the use of *we* and *you* in the plural, to denote an individual; the use of one case for another; as, than *whom* for than *who*.

128. Hyperbaton is the transposition of words and clauses in a sentence, to give variety, force, and vivacity to the composition; as, "Now *come we* to the last;" "He wanders *earth around*."

129. A figure of rhetoric is a deviation from the ordinary application of words in speech, to give animation, strength, and beauty to the composition. These figures are sometimes called tropes.

130. The most important are: Personification, simile, metaphor, allegory, vision, hyperbole, irony, metonymy, synecdoche, antithesis, climax, exclamation, interrogation, paralepsis, apostrophe.

131. Personification is that figure of speech by which we attribute life and action to inanimate objects; as, "The sea saw it and fled."

132. A simile expresses the resemblance that one object bears to another; as, "He shall be like a tree planted by the rivers of water."

133. A metaphor is a simile without the sign (*like*, or *as*, etc.) of comparison; as, "He shall be a tree planted by the rivers of water."

134. An allegory is a continuation of several metaphors, so connected in sense as to form a kind of parable or fable; as, "The people of Israel are represented under the image of a vine."

135. Vision or imagery is a figure by which the speaker represents past events, or the objects of his imagination, as actually present to his senses; as, "Cæsar leaves Gaul, crosses the Rubicon, and enters Italy."

136. An hyperbole is a figure that represents things as greater or less, better or worse, than they really are; thus, David says of Saul and Jonathan, "They were swifter than eagles; they were stronger than lions."

137. Irony is a figure by which we mean quite the contrary of what we say; as, when Elijah said to the worshippers of Baal, "Cry aloud; for he is a god," etc.

138. Metonymy is a figure by which we put the cause for the effect, or the effect for the cause; as, when we say, "He reads Milton," we mean Milton's works; "Gray hairs should be respected"—that is, old age.

139. Synecdoche is the putting of a part for the whole, or the whole for a part, a definite number for an indefinite, etc.; as, the *waves* for the *sea*, the *head* for the *person*, and *ten thousand* for any great number. This figure is nearly allied to metonymy.

140. Antithesis, or contrast, is a figure by which different or contrary objects are contrasted, to make them show one another to advantage; as, "The wicked flee when no man pursueth; but the righteous are as bold as a lion."

141. Climax is the heightening of all the circumstances of an object or action which we wish to place in a strong light; as, "Who shall separate us from the love of Christ? Shall tribulation, or distress, or persecution, or famine, or nakedness, or peril, or sword? Nay," etc.

142. Exclamation is a figure that is used to express some strong emotion of the mind; as, "Oh! the depth of the riches, both of the wisdom and knowledge of God!"

143. Interrogation is a figure by which we express the emotion of our mind, and enliven our discourse by proposing questions; thus, "Hath the Lord said it? and shall He not do it? Hath He spoken it? and shall He not make it good?"

144. Paralepsis is a figure by which the speaker *pretends* to *conceal* what he is really declaring, and strongly enforcing; as, "Horatius was once a very promising young gentleman, but in process of time he became so addicted to gaming, *not to mention his drunkenness and debauchery*, that he soon exhausted his estate, and ruined his constitution."

145. Apostrophe is a turning-off from the subject, to address some other person or thing; as, "*Death is swallowed up in victory.* O, death, where is thy sting?"

146. Versification is the art of arranging words into poetical lines, or verses.

147. A verse is a succession of accented and unaccented syllables, constituting a line of poetry.

148. Verse is of two kinds—rhyme and blank verse.

149. Rhyme is the correspondence of sound in the last syllables of two or more lines.

150. Blank verse is verse without rhyme.

151. A foot is two or more syllables, combined according to accent.

152. The principal feet, in English, are the iambus, the trochee, the anapæst, and the dactyl.

153. The iambus consists of a short and a long syllable. *Ex.*—Ĭnvīte, dĕvōte, bĕnīgn.

154. The trochee consists of a long and a short syllable. *Ex.*—Grātefŭl, griēvoŭs.

155, The anapæst consists of two short syllables and one long one. *Ex.*—Ĭncŏmplēte, cŏndĕscĕnd.

156. The dactyl consists of one long syllable and two short ones. *Ex.*—Pŏsĭtĭve, lōnelĭnĕss.

157. Scanning consists in dividing a verse into the feet which compose it.

158. "That sort of people." Avoid the use of a plural adjective to limit a singular noun.

159. "Whom did he visit?" Never use the nominative as the object of a transitive verb.

160. "I want no aid." Never use two negatives to express a negation.

161. "He said that he should come." Never use *how* before *that*, or instead of it.

162. "Are those your books?" Never use the pronoun *them* for the adjective *those.*

163. "You should speak promptly." Avoid the use of the adjective for the adverb.

164. "The boy did it." Avoid the use of a noun and a pronoun as subject or object of the same verb, unless great emphasis is required.

165. "Let every one attend to *his* work." Avoid the use of a plural pronoun having a singular antecedent.

166. "The hawk which caught the jay." Avoid the use of *who* when speaking of animals and inanimate objects.

167. "The carpenter *who* built the house." Avoid the use of *which* when speaking of persons.

168. "*Whom* did you see?" Avoid the use of the interrogative *who* when the construction requires *whom*.

169. "Where were you?" Avoid the use of a singular verb with a plural subject.

170. "Each of his brothers is well." Avoid the use of a plural verb with a singular subject.

171. "It is I, sir." Never use the objective as the attribute after a finite verb.

172. "You and I will go together." The objective should never be used as the subject of a finite verb.

173. "I have not written, and do not intend to write." *To*, the sign of the infinitive, should never be used for the infinitive itself.

174. "It is she." The attribute of a finite verb should never be in the objective case.

175. "He is the most unhappy man I ever saw." Avoid the use of double comparatives and superlatives.

176. "The king conferred on him the title of duke." Omit the article before a word used as a title, as a mere name, or to denote a class generally.

177. "He is a man of wealth, character, and influence." Avoid the needless repetition of words.

178. "What prevented him from going?" Avoid the omission of words necessary to complete the sense.

179. "He is beloved for his honesty, and for his goodness." Avoid the omission of words necessary to denote emphatic distinction.

180. "I hope to see you soon." Do not omit the subjects of declarative sentences, whether principal or subordinate.

181. "We had some nice lettuce and asparagus for din-

ner." Avoid all perversions—*i. e.*, words habitually mispronounced or misapplied.

182. "I saw him yesterday." "I have seen an old friend to-day." Do not use the perfect participle to express past time, nor the past tense form instead of the perfect participle.

183. "The fact is, that error and truth are blended in their minds." Avoid the recurrence, at short intervals, of the same word in different senses.

184. "He failed to fulfill his promise." Avoid the inelegant use of participles in place of nouns, infinitives, and clauses.

185. "He retired from active service." Avoid the use of improper passive forms.

186. "What did you say her name is." Avoid the expression of universal truths or present facts in any other tense than the present.

187. "If you will go, I will pay your expenses." Avoid the use of different kinds of pronouns in the same construction.

188. "The country looks beautiful after a shower." Do not use adverbs as adjectives.

189. "I am tolerably well, I thank you." Do not use adjectives as adverbs.

190. "I will go; no one shall prevent me."

191. "I would be sorry if you should be sick." Never use ***will*** for *shall*, nor *would* for *should*.

192. "You is *of* the second person," that is, a pronoun of the second person. Avoid such constructions, because "you," being a pronoun, is not a person, and hence is falsely identified by "person."

193. "A boy *who* deceives his father will regret it." In the use of a pronoun, avoid ambiguity in its reference to an antecedent.

194. "The noun James is the *name* of the actor." Avoid constructions in which the thing denoted by the subject is falsely identified by the attribute.

195. "This is an apple." Never use *a* before the sound of a vowel, nor *an* before the sound of a consonant.

196. "He is the wiser of the two." "He is the wisest of them all." Avoid the use of the superlative degree when two objects are compared, or of the comparative when more than two are compared.

197. "He is called captain." Avoid the use of the article before a title or name used merely as a word.

198. "He is a better teacher than poet." Avoid the use of the article before the second noun, when the same object is compared in two different capacities.

199. "The apple tastes sweet." Avoid the use of an adverb when the quality of an object, and not the manner of an action, is to be expressed.

200. "I shall not change my course of action, whether you do or not." Avoid the use of *no*, to express negation, with a verb or a participle.

201. "Frank, James, and John are studying." In a series of coördinate terms, unless great emphasis is required, insert the conjunction between the last two only.

202. "He was not only poor, but idle." In using correlatives, be careful to place both conjunctions so as to mark correctly the prominent or contrasted terms.

203. "I saw him enter the gate and ring the bell." Avoid dissimilar and disproportionate coördinate constructions.

204. "That is different from what I expected." In expressing the relations between words, be careful to employ appropriate prepositions.

205. "My brother is older than I." In using a noun or a pronoun in an elliptical clause following *than* or *as*, avoid both ambiguity and an incorrect construction.

206. "It was your duty to warn him." Do not use the perfect for the present infinitive.

207. "He went to see." The preposition *for* should never be used before the infinitive employed to express motive or purpose.

208. "Between you and me." Never use the nominative as the object of a preposition.

209. "I did it, my kind friend." Never use the objective as the subject of a finite verb.

210. "I knew it to be him." Never use the nominative after an infinitive preceded by its objective subject.

CIVIL GOVERNMENT.

QUESTIONS.

1. What is a Constitution?

2. To accomplish what was the Constitution ordained?

3. All legislative powers herein granted shall be vested in what?

4. Of what is the House of Representatives composed?

5. Why are the members called Representatives?

6. What are the qualifications of electors of Representatives?

7. What is said about congressional districts?

8. How old must a Representative be? How long a citizen of the United States?

9. How are Representatives to be apportioned among the states?

10. For what cause is the basis of representation to be reduced?

11. How are vacancies in the representation of a state to be filled?

12. What officers does the House of Representatives choose?

13. What is census, and how often taken?

14. What representation, at least, shall each state have?

15. What limits are put to the number of Representatives?

16. By whom, and how often, is the number of members fixed?

17. What is said of organized territories?

18. Of how many Senators does the Senate of the United States consist? How are they chosen?

19. Into how many classes are the Senators divided?

20. What is to be done if vacancies happen in the Senate?

21. How old must a Senator be, and how long a citizen of the United States?

22. Who is President of the Senate? What vote has he?

23. Who is President of the Senate when the Vice-President is absent?

24. What sole power has the Senate?

25. Who presides when the President is impeached?

26. What is said of judgment in cases of impeachment?

27. What does the legislature of each state prescribe as regards elections for Senators and Representatives?

28. How often shall Congress assemble?

29. Of what is each house the judge?

30. What may each house do regarding rules and punishments?

31. What is required of each house in regard to keeping and publishing a journal?

32. What prohibition is made as to adjournment?

33. What is said of the compensation of members of Congress?

34. In what cases, and at what times, are members privileged from arrest?

35. For what are they not to be called to account?

36. What restriction is placed upon members as regards civil offices?

37. Can an office-holder be at the same time a member of Congress?

38. Where must all revenue bills originate?

39. What is to be done with every bill when it has passed both houses?

40. After the President has vetoed a bill, how may it become a law?

41. How may a bill, which has neither been signed by the President nor vetoed, become a law?

42. What must be done before any order, resolution, or vote, requiring the concurrence of both houses, can take effect?

43. What powers are granted to Congress?

44. What is said of the migration or importation of certain persons, meaning slaves?

45. What is the writ of *habeas corpus?*

46. When can it be suspended?

47. What is a bill of attainder? Is it allowed?

48. What is an *ex-post facto* law? Is it allowed?

49. How are poll-taxes or other direct taxes to be paid?

50. What is said of duties on articles exported from any state?

51. What commercial preference shall not be given?

52. What is necessary in order to draw money from the treasury?

53. Shall titles of nobility be granted?

54. What is a state forbidden to do?

55. What prohibition is there as to imposts and duties?

56. What prohibition is there as to any duty of tonnage? As to keeping troops?

57. In whom is the executive power vested?

58. What power has Congress as to the time of choosing the electors?

59. What qualifications are required in order to be eligible to the office of President?

60. In what cases does the Vice-President act as President?

61. What is done in case the offices of both President and Vice-President are vacant?

62. What compensation does the President receive for his services?

63. What oath is taken by the President before he enters into the performance of the duties of his office?

64. What position does the President hold with reference to the army and navy?

65. Whose opinion may he require, and on what subjects?

66. What power has he in regard to reprieves and pardons?

67. What power has the President in respect to treaties?

68. What officers shall the President nominate and appoint?

69. If a vacancy happen during a recess of the Senate, how is it filled?

70. What are the duties of the President in respect to Congress?

71. Under what circumstances shall the President, Vice-President, or any civil officer be removed?

72. In what is the judicial power of the United States vested?

73. How long shall the judges hold their offices?

74. To what cases does the judicial power extend?

75. In what cases has the Supreme Court original jurisdiction?

76. How are all crimes but impeachment to be tried? Where shall the trial be held?

77. In what does treason against the United States consist?

78. What testimony is necessary to convict of treason?

79. What body has the power of declaring the punishment of treason?

80. What faith and credit shall be given to each state?

81. What is said of the privileges of the citizens of one state in other states?

82. What is said of a person who is charged with crime in one state and flees into another?

83. What is said of persons held to service or labor, who flee from one state into another?

84. What body has the power to admit new states?

85. What restrictions are mentioned?

86. What is said of the power of Congress over the United States territory and other property?

87. What shall the United States guarantee to each state?

88. What protection is to be afforded the states?

89. How may amendments to the Constitution be proposed?

90. What is said of certain debts and engagements?

91. What constitutes the supreme law of the land?

92. Who are mentioned as being bound thereby?

93. Who are required to be bound by oath or affirmation to support the Constitution?

94. What religious tests are required?

95. What is a preamble?

96. What is a writ of error?

97. What is revenue? A precinct?

98. What is the meaning of *quo warranto?*

99. What is a warrant?

100. What truths are held to be self-evident?

101. What are consuls? Ambassadors?

102. How many amendments to the Constitution? When were the first ten adopted?

103. What is the first amendment to the Constitution?

104. State the second amendment to the Constitution.

105. Repeat the substance of the third amendment.

106. Define the fourth amendment to the Constitution.

107. Tell about the fifth amendment.

108. In the sixth amendment, what right shall the accused enjoy in all criminal prosecutions?

109. State the exact words of the seventh amendment.

110. Define the eighth amendment to the Constitution.

111. What is the ninth amendment to the Constitution?
112. Tell about the tenth amendment.
113. What can you say of the eleventh amendment?
114. What is stated in the thirteenth amendment?
115. Give the exact words of the fifteenth amendment.

CIVIL GOVERNMENT.

ANSWERS.

1. A Constitution is the fundamental law of government in a state, kingdom, or country.

2. To form a more perfect union; establish justice; insure domestic tranquility; provide for the common defence; promote the general welfare; and secure the blessings of liberty to ourselves and our posterity.

3. In a Congress of the United States, which shall consist of a Senate and House of Representatives.

4. The House of Representatives shall be composed of members chosen every second year by the people of the several states.

5. The members are called Representatives because they are supposed to represent the views and wishes of the people who elect them. They act, and speak, and vote as the agent of the people, who are called their constituency.

6. The electors in each state shall have the qualifications requisite for electors of the most numerous branch of the state legislature.

7. Members of the House of Representatives are elected in the several states by congressional districts. When it has been ascertained how many members each state is entitled to, the legislatures of the several states divide them respectively into as many congressional districts as they are each entitled to members. These congressional districts ane numbered, for convenience, 1st, 2d, 3d, etc., and are known by their numbers. The electors of each district vote but for one candidate, though that candidate need not necessarily be a resident of the voter's district. He must, however, as we shall see, be an inhabitant of the state in which he is chosen.

8. A Representative shall be twenty-five years of age, and seven years a citizen of the United States, and shall, when elected, be an inhabitant of the state for which he was chosen.

9. *Representatives are to be apportioned among the several states according to their respective numbers, counting the whole number of persons in each state excluding Indians not taxed.

10. If any state shall disfranchise the male negro population, being twenty-one years of age and citizens of the United States, and prohibit their voting at the usual elections, the basis of representation is to be reduced in the proportion which the number of such male citizens shall bear to the whole number of male citizens twenty-one years of age in such state.

11. The executive authority thereof shall issue writs of election to fill such vacancies.

12. The Chief Clerk, Speaker, Sergeant-at-Arms, Postmaster, and Doorkeeper.

13. Census is an enumeration of the people, regarding a statement of their property, pursuits, age, etc.; and is taken once in ten years. This forms a new apportionment of the number of Representatives to the several states.

14. Each state shall have at least one Representative.

*A part of the XIV Amendment.

15. The number of Representatives shall not exceed one for every thirty thousand inhabitants.

16. The number of members is fixed by a law of Congress once in ten years, and their apportionment is based on the last census.

17. Each organized territory is allowed one *delegate*, who may speak, but not vote, on any question.

18. The Senate of the United States shall be composed of two Senators from each state. They are chosen by the legislature thereof for six years, and each Senator has one vote.

19. They shall be divided, as equally as may be, into three classes. The seats of the Senators of the first class shall be vacated at the expiration of the second year; of the second class, at the expiration of the fourth year; and of the third class, at the expiration of the sixth year; so that one-third may be chosen every second year.

20. The executive of the state may make temporary appointments until the next meeting of the legislature, which shall then fill such vacancies.

21. A Senator must be thirty years of age, and nine years a citizen; and, when elected, must be an inhabitant of that state for which he is chosen.

22. The Vice-President of the United States is President of the Senate, but shall have no vote, unless they be equally divided.

23. The Senate elects one for the time being.

24. The Senate shall have the sole power to try all impeachments, and from their decision there is no appeal.

25. The Chief Justice shall preside; and no person shall be convicted without the concurrence of two-thirds of the members present.

26. Judgment in case of impeachment shall not extend farther than to removal from office, and disqualification to hold and enjoy any office of honor, trust, or profit under the United States; but the party convicted shall, neverthe-

less, be liable and subject to indictment, trial, judgment, and punishment according to law.

27. The times, places, and manner of holding elections; but the Congress may, at any time, by law, make or alter such regulations, except as to the place of choosing Senators.

28. The Congress shall assemble at least once in every year, and such meeting shall be on the first Monday in December, unless they shall by law appoint a different day.

29. Each house shall be the judge of the elections, returns, and qualifications of its own members, and a majority of each shall constitute a quorum to do business; but a smaller number may adjourn from day to day, and may be authorized to compel the attendance of absent members, in such manner and under such penalties as each house may provide.

30. Each house may determine the rules of its proceedings, punish its members for disorderly behavior, and, with the concurrence of two thirds, expel a member.

31. Each house shall keep a journal of its proceedings, and from time to time publish the same, excepting such parts as may, in their judgment, require secrecy; and the yeas and nays of the members of either house, on any question, shall, at the desire of one-fifth of those present, be entered on the journal.

32. Neither house, during the session of Congress, shall, without the consent of the other, adjourn for more than three days; nor to any other place than that in which the two houses shall be sitting.

33. The Senators and Representatives shall receive a compensation for their services, to be ascertained by law, and paid out of the treasury of the United States.

34. They shall, in all cases, except treason, felony, and breach of the peace, be privileged from arrest during their attendance at the session of their respective houses, and in going to or returning from the same.

35. They shall not be called to account for any speech

or debate in either house, and they shall not be questioned in any other place.

36. No Senator or Representative shall, during the time for which he was elected, be appointed to any civil office under the authority of the United States, which shall have been created, or the emoluments whereof shall have been increased, during such time.

37. No person holding any office under the United States shall be a member of either house during his continuance in office.

38. All revenue bills shall originate in the House of Representatives; but the Senate may propose or concur with amendments, as on other bills.

39. Every bill which shall have passed the House of Representatives and the Senate shall, before it becomes a law, be presented to the President of the United States; if he approve, he shall sign it, but if not, he shall return it, with his objections, to that house in which it shall have originated, who shall enter the objections at large on their journal, and proceed to reconsider it.

40. If, after reconsideration, two-thirds of that house where it originated shall agree to pass the bill, it shall be sent, together with the objections, to the other house, by which it shall likewise be reconsidered, and if approved by two-thirds of that house, it shall become a law. But in all such cases the votes of both houses shall be determined by yeas and nays; and the names of the persons voting for and against the bill shall be entered on the journal of each house respectively.

41. If any bill shall not be returned by the President within ten days (Sundays excepted) after it shall have been presented to him, the same shall become a law in like manner as if he had signed it, unless the Congress by their adjournment prevent its return, in which case it shall not be a law.

42. Every order, resolution, or vote to which the concurrence of the Senate and House of Representatives may

be necessary—except on a question of adjournment—shall be presented to the President of the United States; and, before the same shall take effect, shall be approved by him, or, being disapproved by him, shall be re-passed by two-thirds of the Senate and House of Representatives, according to the rules and limitations prescribed in the case of a bill.

43. The Congress shall have power to lay and collect taxes, duties, imposts, and excises, to pay the debts and provide for the common defence and general welfare of the United States; but all duties, imposts, and excises shall be uniform throughout the United States; to borrow money on the credit of the United States; to regulate commerce with foreign nations, and among the several states, and with the Indian tribes; to establish a uniform rule of naturalization, and uniform laws on the subject of bankruptcies, throughout the United States; to coin money, regulate the value thereof and of foreign coin, and fix the standard of weights and measures; to provide for the punishment of counterfeiting the securities and current coin of the United States; to establish post-offices and post-roads; to promote the progress of science and useful arts, by securing for limited times to authors and inventors the exclusive right to their respective writings and discoveries; to constitute tribunals inferior to the Supreme Court; to define and punish felonies committed on the high seas, and offences against the laws of nations; to declare war, grant letters of marque and reprisal, and make rules concerning captures on land and water; to raise and support armies, but no appropriation of money to that use shall be for a longer term than two years; to provide and maintain a navy; to make rules for the government and regulation of the land and naval forces; to provide for calling forth the militia to execute the laws of the Union, suppress insurrections, and repel invasions; to provide for organizing, arming, and disciplining the militia, and for governing such part of them as may be employed in the service of the United

States, reserving to the states respectively the appointment of the officers, and the authority of training the militia, according to the discipline prescribed by Congress; to exercise exclusive legislation, in all cases whatsoever, over such district—not exceeding ten miles square—as may, by cession of particular states and the acceptance of Congress, become the seat of government of the United States, and to exercise like authority over all places purchased by the consent of the legislature of the state in which the same shall be, for the erection of forts, magazines, arsenals, dock-yards, and other needful buildings; and to make all laws which shall be necessary and proper for carrying into execution the foregoing powers, and all other powers vested by this Constitution, in the government of the United States, or in any department or officer thereof.

44. The migration or importation of such persons as any of the states now existing shall think proper to admit, shall not be prohibited by Congress prior to the year one thousand eight hundred and eight; but a tax or duty may be imposed on such importation, not exceeding ten dollars for each person.

45. The writ of *habeas corpus* is a writ for delivering a person from false imprisonment.

46. It shall be suspended only in case of rebellion or invasion; when the public safety may require it.

47. A bill of attainder is a special act of the legislature inflicting capital punishment upon persons supposed to be guilty of high crimes, without due process of law. It is not allowed.

48. An *ex-post facto* law is a law making an act criminal which was not so considered when done. It is not allowed.

49. No poll-tax or other direct tax shall be laid, unless in proportion to the census or enumeration hereinbefore directed to be taken.

50. No tax or duty shall be laid on articles exported from any state.

51. No preference shall be given by any regulation of commerce or revenue to the ports of one state over those of another; nor shall vessels bound to, or from, one state, be obliged to enter, clear, or pay duties in another.

52. No money shall be drawn from the treasury but in consequence of appropriations made by law; and a regular statement and account of the receipts and expenditures of all public money shall be published from time to time.

53. No title of nobility shall be granted by the United States; and no person holding any office of profit or trust under them shall, without the consent of Congress, accept of any present, emolument, office, or title, of any kind whatever, from any king, prince, or foreign state.

54. No state shall enter into any treaty, alliance, or confederation; grant letters of marque and reprisal; coin money; emit bills of credit; make anything but gold and silver coin a tender in payment of debts; pass any bill of attainder, *ex-post facto* law, or law impairing the obligation of contracts, or grant any title of nobility.

55. No state shall, without the consent of Congress, lay any imposts or duties on imports or exports, except what may be absolutely necessary for executing its inspection laws; and the net produce of all duties and imposts laid by any state on imports or exports shall be for the use of the treasury of the United States; and all such laws shall be subject to the revision and control of Congress.

56. No state shall, without the consent of Congress, lay any duty of tonnage, keep troops or ships of war in time of peace, enter into any agreement or compact with another state, or with a foreign power, or engage in war, unless actually invaded, or in such imminent danger as will not admit of delay.

57. (*a.*) In a President of the United States of America. He shall hold his office during the term of four years, and, together with the Vice-President, chosen for the same term, be elected as follows:

(*b.*) Each state shall appoint, in such manner as the

legislature thereof may direct, a number of electors, equal to the whole number of Senators and Representatives to which the state may be entitled in Congress; but no Senator or Representative, or person holding an office of trust or profit under the United States, shall be appointed an elector.

(*c.*) *The electors shall meet in their respective states, and vote by ballot for President and Vice-President, of whom one at least shall not be an inhabitant of the same state with themselves. They shall name in their ballots the person voted for as President, and in distinct ballots the person voted for as Vice-President, and they shall make distinct lists of all persons voted for as President, and of all persons voted for as Vice-President, and of the number of votes for each; which lists they shall sign and certify, and transmit, sealed, to the seat of the government of the United States, directed to the President of the Senate. The President of the Senate shall, in the presence of the Senate and House of Representatives, open all the certificates, and the votes shall then be counted. The person having the greatest number of votes for President, shall be the President, if such number be a majority of the whole number of electors appointed; and if no person have such majority, then from the persons having the highest numbers, not exceeding three, on the list of those voted for as President, the House of Representatives shall choose immediately, by ballot, the President. But in choosing the President, the votes shall be taken by states, the representation from each state having one vote. A quorum for this purpose shall consist of a member or members from two-thirds of the states, and a majority of all the states shall be necessary to a choice. And if the House of Representatives shall not choose a President, whenever the right of choice shall devolve upon them, before the fourth day of March next following, then the Vice-President shall act as President, as in the case of the death or other constitutional dis-

*XII Amendment.

ability of the President. The person having the greatest number of votes as Vice-President, shall be the Vice-President, if such number be a majority of the whole number of electors appointed; and if no person have a majority, then from the two highest numbers on the list, the Senate shall choose the Vice-President; a quorum for the purpose shall consist of two-thirds of the whole number of Senators, and a majority of the whole number shall be necessary to a choice. But no person constitutionally ineligible to the office of President shall be eligible to that of Vice-President of the United States.

58. Congress may determine the time of choosing the electors, and the day on which they shall give their votes, which day shall be the same throughout the United States.

59. No person except a natural-born citizen, or a citizen of the United States at the time of the adoption of this Constitution, shall be eligible to the office of President; neither shall any person be eligible to that office who shall not have attained to the age of thirty-five years, and been fourteen years a resident within the United States.

60. In case of the removal of the President from office, or of his death, resignation, or inability to discharge the powers and duties of the said office.

61. Congress may by law provide for the case of removal, death, resignation, or inability, both of the President and Vice-President, declaring what officer shall then act as President; and such officer shall act accordingly, until the disability be removed or a President shall be elected.

62. The President shall, at stated times, receive for his services a compensation which shall neither be increased nor diminished during the period for which he shall have been elected; and he shall not receive, within that period, any other emolument from the United States, or any of them.

63. "I do solemnly swear [or affirm] that I will faithfully execute the office of President of the United States,

and will, to the best of my ability, preserve, protect, and defend the Constitution of the United States."

64. The President shall be commander-in-chief of the army and navy of the United States and of the militia of the several states, when called into the actual service of the United States.

65. He may require the opinion in writing of the principal officer in each of the executive departments, upon any subject relating to the duties of their respective offices.

66. He shall have power to grant reprieves and pardons for offences against the United States, except in cases of impeachment.

67. He shall have power, by and with the advice and consent of the Senate, to make treaties, provided two-thirds of the Senators present concur.

68. He shall nominate, and, by and with the advice and consent of the Senate, shall appoint, embassadors, other public ministers and consuls, judges of the Supreme Court, and all other officers of the United States whose appointments are not herein otherwise provided for, and which shall be established by law; but Congress may by law vest the appointment of such inferior officers as they think proper in the President alone, in the courts of law, or in the heads of departments.

69. By the President, who shall have power to fill all vacancies that may occur during the recess of the Senate, by granting commissions, which shall expire at the close of their next session.

70. He shall, from time to time, give to Congress information of the state of the Union, and recommend to their consideration such measures as he shall judge necessary and expedient; he may, on extraordinary occasions, convene both houses, or either of them; and, in case of disagreement between them with respect to the time of adjournment, he may adjourn them to such time as he may think proper; he shall receive embassadors and other public ministers; he shall take

care that the laws be faithfully executed, and shall commission all the officers of the United States.

71. They shall be removed from office on impeachment for and conviction of treason, bribery, and other high crimes and misdemeanors.

72. It shall be vested in one Supreme Court, and in such inferior courts as Congress may from time to time ordain and establish.

73. They shall hold their offices during good behavior; and shall, at stated times, receive for their services a compensation which shall not be diminished during their continuance in office.

74. In all cases arising under the Constitution; the laws of the United States; to controversies between two or more states; and cases that cannot be settled in the Supreme Court of any state.

75. In all cases affecting embassadors, other public ministers and consuls, and those in which a state shall be party, the Supreme Court shall have original jurisdiction.

76. They shall be by jury; and such trial shall be held in the state where the said crimes shall have been committed; but when not committed within any state, the trial shall be at such place or places as Congress may by law have directed.

77. It shall consist only in levying war against them, or in adhering to their enemies, giving them aid and comfort.

78. The testimony of two witnesses to the same overt act, or on confession in open court.

79. Congress shall have power to declare the punishment of treason; but no attainder of treason shall work corruption of blood, or forfeiture, except during the life of the person attainted.

80. Full faith and credit shall be given in each state to the public acts, records, and judicial proceedings of every other state, and Congress may by general laws prescribe the manner in which such acts, records, and proceedings shall be proved, and the effect thereof.

81. The citizens of each state shall be entitled to all privileges and immunities of citizens in the several states.

82. A person charged in any state with treason, felony, or other crime, who shall flee from justice and be found in another state, shall, on demand of the executive authority of the state from which he fled, be delivered up to be removed to the state having jurisdiction of the crime.

83. No person held to service or labor in one state, under the laws thereof, escaping into another, shall, in consequence of any law or regulation therein, be discharged from such service or labor, but shall be delivered up on claim of the party to whom such service or labor may be due.

84. Congress has power to admit new states.

85. No new state shall be formed or erected within the jurisdiction of any other state; nor any state be formed by the junction of two or more states, or parts of states, without the consent of the legislatures of the states concerned, as well as of Congress.

86. Congress shall have power to dispose of, and make all needful rules and regulations respecting the territory or other property belonging to the United States; and nothing in this Constitution shall be so construed as to prejudice any claims of the United States, or of any particular state.

87. The United States shall guarantee to every state in this Union a republican form of government.

88. The United States shall protect each state against invasion; and, on application of the legislature, or of the executive—when the legislature cannot be convened—against domestic violence.

89. By a two-thirds vote of both houses, or by the action of the legislature of two-thirds of the states, ratified in either case by three-fourths of all the states.

90. All debts contracted and engagements entered into before the adoption of this Constitution shall be as valid against the United States under this Constitution as under the confederation.

91. This Constitution, and the laws of the United States

which shall be made in pursuance thereof, and all treaties made, or which shall be made, under the authority of the United States, shall be the supreme law of the land.

92. The judges in every state shall be bound thereby, anything in the Constitution or laws of any state to the contrary notwithstanding.

93. The Senators and Representatives before mentioned, and the members of the several state legislatures, and all executive and judicial officers, both of the United States and of the several states, shall be bound by oath or affirmation to support this Constitution.

94. There shall be no religious tests required as a qualification to any office or public trust under the United States.

95. Something going before; an introduction to a document, and generally assigning reasons for what follows.

96. A writ authorizing a court to bring before it a record of the same or some other court, to determine whether there is any error in the same, or in the proceedings thereon; and, if so, to correct it.

97. Revenue is the income of a government arising from taxes, duties, etc. A precinct is a division of territory; an election district.

98. A *quo warranto* is a form of writ, citing a party before a court to show by what warrant he exercises a certain office, etc.

99. Written authority from a court to an officer to perform some act; especially to arrest a supposed criminal.

100. That all men are created equal; that they are endowed by their Creator with certain inalienable rights; that among these are life, liberty, and the pursuit of happiness.

101 Consuls are persons appointed by the President to act as advisers of mariners, travelers, and others—American citizens—in foreign cities, to hear complaints and protests, and otherwise assist them in need. Ambassadors are ministers of the highest rank, employed by a government to represent it, and to manage its interests, at the court or seat of government of some other power.

102. There are fifteen; the first ten were adopted at the first session of Congress.

103. Congress shall make no law respecting an establishment of religion, or prohibiting the free exercise thereof; or abridging the freedom of speech, or of the press, or of the right of the people peaceably to assemble, and to petition the government for a redress of grievances.

104. A well-regulated militia being necessary to the security of a free state, the right of the people to keep and bear arms shall not be infringed.

105. No soldier shall, in time of peace, be quartered in any house, without the consent of the owner, nor in time of war, but in a manner to be prescribed by law.

106. The right of the people to be secure in their persons, houses, papers, and effects, against unreasonable searches and seizures, shall not be violated, and no warrants shall issue, but upon probable cause, supported by oath or affirmation, and particularly describing the place to be searched, and the persons or things to be seized.

107. No person shall be held to answer for a capital or otherwise infamous crime, unless on a presentment or indictment of a grand-jury, except in cases arising in the land or naval forces, or in the militia, when in actual service in time of war or public danger; nor shall any person be subject for the same offence to be twice put in jeopardy of life or limb; nor shall be compelled in any criminal case to be a witness against himself, nor be deprived of life, liberty, or property, without due process of law; nor shall private property be taken for public use without just compensation.

108. In all criminal prosecutions, the accused shall enjoy the right to a speedy and public trial, by an impartial jury of the state and district wherein the crime shall have been committed, which district shall have been previously ascertained by law, and to be informed of the nature and cause of the accusation; to be confronted with the witnesses against him; to have compulsory process for obtaining witnesses in his favor, and to have the assistance of counsel for his defence.

109. In suits at common law, where the value in controversy shall exceed twenty dollars, the right of trial by jury shall be preserved, and no fact tried by a jury shall be otherwise re-examined in any court of the United States than according to the rules of the common law.

110. Excessive bail shall not be required, nor excessive fines imposed, nor cruel and unusual punishments inflicted.

111. The enumeration in the Constitution, of certain rights, shall not be construed to deny or disparage others retained by the people.

112. The powers not delegated to the United States by the Constitution, nor prohibited by it to the states, are reserved to the states respectively, or to the people.

113. The judicial power of the United States shall not be construed to extend to any suit in law or equity commenced or prosecuted against one of the United States by citizens of another state, or by citizens or subjects of any foreign state.

114. Neither slavery nor involuntary servitude, except as a punishment for crime whereof the party shall have been duly convicted, shall exist within the United States, or any place subject to their jurisdiction.

115. The right of the citizens of the United States to vote shall not be denied or abridged by the United States, or by any state, on account of race, color, or previous condition of servitude.

GEOGRAPHY.

QUESTIONS.

1. What is Geography?

2. What is the earth?

3. What was necessary to fit the earth to be man's home?

4. What is the length of the American Continent, from north to south?

5. Which is the largest city of the Western Continent?

6. What isthmus unites South America to North America? How wide is it?

7. What strait connects the Arctic and Pacific Oceans? How wide is it?

8. How wide is the Indian Ocean?

9. Where is King William's Island?

10. What parallel of latitude forms part of the boundary between British America and the United States?

11. Which is the largest sea in the world? The largest salt sea?

NOTE.—Throughout this entire work statistical reports are given from the latest census.

12. Which are the highest mountains in the world? The highest peak?

13. Which is the largest peninsula in the world? The second in size?

14. What can you say of the Suez Canal?

15. Name, in order, five of the largest islands in the world.

16. Name, in order, six of the largest cities, in population, in the world.

17. Name, in order, three of the first cities in commerce.

18. For what purpose has the Arctic Ocean been frequently explored?

19. Is such a passage now known to exist?

20. Which is the highest point reached by Arctic navigators? When, and by whom?

21. What point was reached by Dr. Kane?

22. Have we any information concerning the fate of Sir John Franklin's expedition?

23. What other individuals made Arctic explorations?

24. State what you can regarding the United States Arctic exploring steamer, Jeannette.

25. What latitude has been reached in the Antarctic Ocean?

26. To what country do Greenland and Iceland belong?

27. What are the chief settlements on the Atlantic coast of Labrador?

28. For what is the Bay of Fundy noted?

29. What can you say of the banks of Newfoundland?

30. What is the length of the Missouri River? The Mississippi River?

31. Why do most of the rivers between the Alleghany and the Rocky Mountains flow toward the Mississippi River?

32. What is Montreal? Toronto? Quebec?

33. For what is New York noted?

34. What can you say of Philadelphia?
35. Tell what you can about Brooklyn.
36. What can you say of Chicago?
37. For what is Boston noted?
38. Tell what you can about St. Louis.
39. What is said in regard to Baltimore?
40. What can you say of Cincinnati?
41. State what you can regarding San Francisco.
42. What can you say of New Orleans?
43. Tell what you can about Washington, D. C.
44. For what is Portland noted?
45. Describe the situation of Manchester.
46. What is the situation of Burlington?
47. For what is Providence noted?
48. Describe the situation of New Haven.
49. For what is Newark distinguished?
50. For what is Wilmington (Del.) noted?
51. What can you say of Richmond?
52. What is the importance of Wheeling?
53. What can you say of Wilmington, N. C.?
54. State what you can regarding Charleston.
55. What can you say of Savannah?
56. State the noteworthy facts regarding Jacksonville, Key West, and Pensacola.
57. What can you say of Mobile and Montgomery?
58. Name the principal cities of Mississippi, and mention their main business.
59. What is the importance of Galveston?
60. What can you say of Memphis?
61. What can you say in regard to the size of the cities in Arkansas?
62. What can you say regarding Louisville?
63. Describe the location of Indianapolis.
64. Describe the location of Detroit.
65. State what you can regarding Milwaukee.
66. How is St. Paul situated?
67. Where is Dubuque located?

68. What can you say of Leavenworth?
69. What can you say of Omaha?
70. Describe the location of Portland.
71. For what is Virginia City famous?
72. What can you say of Denver?
73. What is the chief town in Indian Territory?
74. What may be said of Washington Territory?
75. State what you can of Idaho Territory.
76. Describe the location of Montana Territory.
77. Describe the location of Dakota Territory.
78. Tell what you can about Wyoming Territory.
79. State what you can about Utah Territory.
80. Give a description of Arizona Territory.
81. What can you say of New Mexico Territory?
82. What obstruction to navigation in the Tennessee River?
83. What is a reef? What are keys?
84. How many miles of steamboat navigation above New Orleans, on the Mississippi and its tributaries?
85. What canal in the eastern part of Ohio?
86. What important canal in the northern peninsula of Michigan?
87. What canal in Wisconsin?
88. What communication does this canal open?
89. Where is the gold region of California?
90. In what parts of Oregon has gold been found?
91. Where are the principal gold and silver mines of Idaho?
92. Where is the chief silver-mining region of Nevada?
93. Where are the principal gold and silver mines of Arizona?
94. What is the general altitude of the Rocky Mountains?
95. How far is the Missouri navigable for steamboats?
96. Where is the gold region of Montana?
97. Where is the gold region of Colorado?

98. How far is the Rio Grande navigable for steamboats?

99. For what is Sour Lake noted?

100. What is Central America, considered geographically?

101. What is Central America, considered politically?

102. For what is Volcano Agua noted?

103. What are the Windward Islands?

104. Why are they so called?

105. What are the Leeward Islands?

106. For what is Guanahani, or San Salvador noted?

107. What two distinct governments in the island of Hayti?

108. For what is Volcano Aconcagua noted?

109. What is the extent of the basin of the Amazon?

110. What city in South America is famous for silver mines?

111. Name seven of the largest cities in South America, in order of population.

112. Where are the Dovrefield Mountains?

113. Name seven of the largest cities in Europe, in order of population.

114. What celebrated promontory in the southern part of Spain?

115. For what is the island of Corsica noted?

116. How has Denmark become reduced in size?

117. What important canal in the northern part of Holland?

118. How is Amsterdam situated?

119. What islands form part of the Kingdom of Greece?

120. For what is Mecca noted?

121. For what is Irkoutsk noted?

122. Which is the most elevated lake in the world?

123. For what is the valley of the Jordan remarkable?

124. What is the Runn of Cutch?

125. Name seven of the largest cities in Asia, in order of population.

126. How large is the United States?

127. For what is St. Helena famous?

128. For what is Alexandria noted?

129. For what is Cairo noted?

130. How does England compare in size with the United States?

131. Why are the winters milder at Puget Sound than in the region of Lake Superior?

132. Which is larger, the United States or Europe?

133. How does Europe compare in size and population to Asia?

134. How many kinds of government?

135. What is a Monarchy?

136. What is an Aristocracy?

137. What is a Democracy?

138. Name and give the length of the longest six rivers of North America.

139. What is the descent of the cataract of Niagara?

140. Name and give the length of the longest six rivers of South America.

141. What country in the world has the longest and most numerous lines of railroad?

142. What are the mountain systems of America?

143. Why does so little rain fall on that part of South America west of the Andes mountain range?

144. Name and give the length of the longest six rivers of Europe.

145. How far south of New York City is Richmond?

146. How far north does South America extend?

147. What is the general character of the lakes of South America?

148. Describe Lakes Titicaca and Maracaibo.

149. Name and give the length of the longest six rivers of Asia.

150. Name the Middle States.

151. Where are the negroes held as slaves?

152. How large are Cuba and Hayti?

153. Where are the great wheat-growing regions of Europe?

154. In what does the chief wealth of Great Britain consist?

155. How does Great Britain rank with other nations, in the amount of her manufactures and commerce?

156. What is the chief article of fuel in Ireland?

157. What are the foreign possessions of Spain?

158. What fashionable resorts for sea-bathing in New Jersey?

159. Name and give the length of the longest six rivers in Africa

160. How large is Australia?

161. What are the chief pursuits of the people of Australia?

162. Which is the larger, New York or Pennsylvania?

163. Describe Alaska.

164. Is Alaska valuable to the United States?

165. What is the government of Alaska?

166. How much larger is Asia than Africa?

167. How large is the Desert of Sahara?

168. Locate the capital cities of the territories of the United States.

169. Describe the Union Pacific Railroad.

170. Locate the principal towns on the Union Pacific Railroad.

171. What states are separated by the Mississippi River?

172. What states are separated by the Ohio River?

173. What is the climate of Europe?

174. Name and classify the political divisions of Europe.

175. How much farther north can grain be raised in Norway than on the Atlantic shore of America?

176. What is the size of the Russian Empire?

177. How are the inhabitants of this empire divided?

178. How is Scotland divided?

179. What is the character of the sea-coast of Scotland?

180. How large is France?

181. How does France rank with other countries?

182. What influence has Paris throughout the civilized world?

183. For what was Italy celebrated in ancient times?

184. What was the condition of Greece in ancient times?

185. Which is the larger, Mexico or the United States?

186. Into what divisions are the United States divided?

187. What country does the Atlantic Slope include?

188. What country does the Pacific Slope include?

189. What section is included in the Central Plain?

190. Into how many divisions may the United States be divided, with respect to its drainage?

191. In what does South America excel all other continents?

192. In what does Great Britain exceed every other country?

193. What are the chief uses of rivers?

194. Which is the larger, China or the United States?

195. Name five of the chief articles exported by the people of the United States.

196. Name five of the chief articles imported.

197. What is the horizon?

198. What is the government of Persia?

199. Why is the water of Great Salt Lake not fresh?

200. What are the productions of China?

201. What is the climate of Central and Southern Asia?

202. For what has Siberia long been used?

203. What peninsulas belong to Mexico?

204. How are the seasons of Mexico divided?

205. How many miles of sea-coast has New Hampshire?

206. What would be the climate, provided the earth's axis was horizontal to the plane of its orbit?

207. What divisions are called the "Five Great Powers?"

208. What state produces the most tobacco? Wheat? Rice? Cotton? Sugar? Corn? Sweet potatoes?

209. What is South Carolina often called?

210. What important places of the globe are situated on or near the 40th parallel, north latitude?

211. What state has the greatest number of horses? Mules? Sheep? Swine? Cattle?

212. What is noticeable of the Missouri River?

213. Where is marble obtained?

214. What state produces the greatest quantity of gold? Silver? Lead? Pine lumber? Turpentine? Copper? Coal? Iron?

215. What natural curiosities are there in Iceland?

216. What gave the name of Iceland?

217. How is Italy governed?

218. Where is Nijni Novgorod, and what takes place there every year?

GEOGRAPHY.

ANSWERS.

1. Geography is that science which treats of the world and its inhabitants.

2. The earth is one of a class of bodies called *Planets*, which constantly revolve around the sun, and receive light and heat from it.

3. The land, the water, and the air; the sunlight falling upon them, and the useful plants and animals, which are so abundant, are all necessary for the comfort and well-being of man, for whose home the earth was made.

4. The length of the American Continent, from north to south, is about 9,000 miles.

5. The largest city of the Western Continent is New York.

6. The Isthmus of Panama. It is 28 miles wide in its narrowest part.

7. Behring's Strait. It is 40 miles in width.

8. The Indian Ocean is about 4,000 miles wide.

9. King William's Island lies in the northern part of British America.

10. The 49th parallel of north latitude.

11. The Mediterranean Sea. The Caspian Sea.

12. The Himalaya Mountains. Mount Everest, which is 29,000 feet above the sea-level.

13. The largest peninsula in the world is Africa. The second in size is South America.

14. This great ship canal, one hundred miles in length, connects Suez on the Red Sea with Port Said on the Mediterranean. It was commenced by a company, aided by large subscriptions of the governments of Egypt, France, and England, in 1858, and opened November 17th, 1869. It is 72 feet wide at the bottom, about 300 feet at the surface, and 26 feet in depth, easily passing the largest vessels. The controlling interest in the canal was purchased for £4,000,000, in 1875, by the British government, which now holds it.

15. The five largest islands in the world, are, Australia, Greenland, New Guinea, Borneo, and Madagascar Islands.

16. London, Paris, Canton, New York, Berlin, and Singan-fu.

17. London, Liverpool, and New York.

18. The Arctic Ocean has been frequently explored in order to find a northwest passage from the Atlantic to the Pacific Ocean.

19. In 1852, Captain McClure, while in search of Sir John Franklin, accomplished the passage, but did not *sail* through it on account of the ice. The same cause will probably prevent its ever being of any commercial value. Later expeditions have been fitted out for the purpose of accomplishing this passage, but without success.

20. The highest point reached by Arctic navigators is 82° 45′—502 miles from the pole; in 1827, by Captain Parry.

21. The highest point reached by Dr. Kane is 82° 30′—519 miles from the pole, where he found the shore of an open polar sea.

22. Yes. The expedition of Captain McClintock, R.

N., in the yacht Fox, which returned in 1859, discovered remains and relics of Sir John Franklin's expedition, and set at rest all question concerning the fate of that gallant explorer and his companions.

23. Dr. Hayes, in 1861, and Captain Hall, in 1862, 1864, and 1867, also made voyages of Arctic exploration.

24. The Jeannette was fitted out by James Gordon Bennett, Jr., proprietor of the New York Herald, and sailed from San Francisco on an Arctic exploring expedition July 8th, 1879, with Lieutenant De Long as commander. Numerous hardships were encountered during the years 1879–80–81, and on the 13th of June, 1881, near 77° 8′ north latitude, all were compelled to abandon the Jeannette, which sank below the surface of the water with the stars and stripes flying at its masthead.

25. The latitude reached in the Antarctic Ocean is 78° 10′—830 miles from the pole, by Captain Ross, in 1842.

26. Greenland and Iceland belong to Denmark. They are sometimes called Danish America.

27. The chief settlements on the Atlantic coast of Labrador are Okkak and Nain.

28. The Bay of Fundy is noted for its very high tides, which in some places rise to the height of seventy-one feet.

29. The banks of Newfoundland are noted for the immense number of codfish caught on them.

30. The Missouri River, to its junction with the Mississippi, is 2,800 miles in length. Missouri to the sea, forming the longest river in the world, 4,100 miles. The length of the Mississippi River, proper, is 2,800 miles.

31. Because the surface slopes from both these mountain chains to the Mississippi River.

32. Montreal is the largest city in Canada, and the chief depot of trade with the United States. Population, 107,225. Toronto is the second city in Canada, being a handsomely built and prosperous city. It is the seat of the Queen's University, and has many and important manufactures, and a safe and commodious harbor. Population,

70,865. Quebec is the third city in Canada, and is noted for great foreign commerce, the lumber trade, and ship-building. Its fortifications, nearly three miles in circuit, added to its natural commanding position, constitute it one of the strongest fortresses on the American continent. Population, 65,000.

33. New York is the most populous city, and the chief emporium, in America; in commerce, surpassed only by London and Liverpool; extensive manufactures of steam machinery, ironware, clothing, and cabinet furniture; ship-building and sugar refining; immense publishing business; assay office; Columbia College, New York University, New York College, and Astor Library. Pop., 1,206,577. Area of New York State, 47,000 sq. m. Pop., 5,082,871.

34. Philadelphia is the second city in population, and the fourth in foreign commerce. It is first in manufactures, which comprise almost every species of iron manufacture, cotton and woolen goods, boots and shoes, chemicals, jewelry, etc.; ship-building and sugar refining; the principal coal market in the Union; United States navy yard and mint; Girard College, and Pennsylvania University. Pop., 847,-170. Area of Pennsylvania, 46,000 sq. m. Pop., 4,283,223.

35. Brooklyn is the third city in population; connected with New York City by steam ferries; great grain depot; spacious docks and warehouses; United States navy yard. Pop., 566,689.

36. Chicago is the fourth city in population, and is noted for its unparalleled growth; greatest interior grain market in the world; largest lumber market and beef and pork-packing point in the United States. Pop., 503,185. Area of Illinois, 55,400 sq. m. Pop., 3,078,220.

37. Boston is the fifth city in population; the second in foreign commerce; extensive manufactures; ship-building; numerous literary, scientific, and educational institutions. Pop., 369,832. Area of Massachusetts, 7,800 sq. m. Pop., 1,783,-683.

38. St. Louis, the sixth city in population, is the com-

mercial center of the Mississippi Valley; immense river trade; extensive flouring business, and manufactures of iron, chemicals, oils, etc.; vicinity of rich mineral region; and University of St. Louis. Pop., 350,518. Area of Missouri, 65,400 sq. m. Pop., 2,168,584.

39. Baltimore is the seventh city in population, and third in foreign commerce; great market for flour, grain, tobacco, and oysters; numerous flour mills; manufactures of locomotives, etc. Pop., 332,313. Area of Maryland, 11,000 sq. m. Pop., 934,943.

40. Cincinnati, the eighth city in population, is one of the most populous cities of the West; commercial center of the Ohio Valley; great pork market; extensive manufactures; large quantities of wine made from the Catawba grape; and Cincinnati College. Pop., 255,809. Area of Ohio, 40,000 sq. m. Pop., 3,198,301.

41. San Francisco is the ninth city in population; the commercial metropolis of Western North America; the best harbor on the Pacific coast; immense exportation of gold and flour; State Normal School, and United States branch mint. Pop., 233,959. Area of California, 189,000 sq. m. Pop., 956,103.

42. New Orleans, the tenth city in population, is the commercial emporium of the South; the greatest cotton market in the world; the principal sugar market in the Union; and the United States branch mint. Pop., 216,090. Area of Louisiana, 41,300 sq. m. Pop., 941,283.

43. Washington, the national capital, contains many elegant public buildings, among which is the Capitol, one of the finest edifices in the world; Smithsonian Institute and National Observatory. The principal navy yard and arsenal of the United States are located here. Pop., 147,293. Area of District of Columbia, 60 sq. m. Pop., 177,624.

44. Portland, the largest city of Maine, is at the termination of the Grand Trunk railway of Canada, and is noted for its excellent harbor and its extensive commerce. It is the principal eastern gateway to the St. Lawrence Valley in the

winter. Pop., 33,810. Area of Maine, 32,000 sq. m. Pop., 649,561.

45. Manchester is the largest city of New Hampshire, being situated on the Merrimac River, eighteen miles below Concord. It occupies both sides of the river, but is chiefly on the left. At this point are the Amoskeag Falls, the most extensive on the course of the Merrimac. Great quantities of cotton goods, delaines, etc., are manufactured here. Pop., 32,630. Area of New Hampshire, 9,300 sq. m. Pop., 347,054.

46. Burlington, the chief city of Vermont, is situated on the shore of Lake Champlain, near the mouth of Winooski River. It is connected by railroad with Montreal and Quebec, as well as with Boston and New York; has a large lumber trade, and is the seat of the State University. Pop., 11,364. The census of 1880 shows Rutland to be the largest city in the state, having a population of 12,149 inhabitants. Area of Vermont, 10,200 sq. m. Pop., 332,286.

47. Providence, the most populous city of Rhode Island, and one of the state capitals, is noted for its large commerce and extensive cotton manufacturies. It is the seat of Brown University, and is, excepting Boston, the most populous city of New England. Pop., 104,857. Area of Rhode Island, 1,300 sq. m. Pop., 276,608.

48. New Haven, the largest city of Connecticut, is situated on a fine bay entering from Long Island Sound, in the southern part of the state. It is the seat of Yale College; is the third city of New England in population, and is one of the most beautiful cities of the United States, being famous for its magnificent elm trees. Pop., 62,882. Area of Connecticut, 4,700 sq. m. Pop., 623,078.

49. Newark, the largest city of New Jersey, is eight miles from New York Harbor, and is a part of the same great commercial center with New York and Brooklyn. It is distinguished for the great variety of its manufactures, such as machinery, carriages, hardware, leather, clothing, etc.

Pop., 136,508. Area of New Jersey, 8,300 sq. m. Pop., 1,131,360.

50. Wilmington, the chief city of Delaware, is noted for its large machine shops and car-factories; also has a very extensive manufactory of gunpowder. Pop., 42,478. Area of Delaware, 2,100 sq. m. Pop., 146,608.

51. Richmond, the capital, and largest city in Virginia, is at the head of navigation on the James River, and is the present terminus of the Chesapeake and Ohio Railroad. It is an important commercial center, and has large flouring mills, tobacco factories, and iron works. Pop., 63,600. Area of Virginia, 38,300 sq. m. Pop., 1,512,565.

52. Wheeling, on the Ohio River and the Baltimore and Ohio railroad, is the present capital, and the only large city in West Virginia. It has a large coal trade, and extensive glass-works, iron works, and other manufactories. Pop., 30,737. Area of West Virginia, 23,000 sq. m. Pop., 618,457.

53. Wilmington, the largest city of North Carolina, has large turpentine distilleries and lumber-mills. It is one of the chief commercial centers of the state. The principal articles of trade are lumber, naval stores, and grain. Pop., 17,-361. Area of North Carolina, 50,700 sq. m. Pop., 1,400,-980.

54. Charleston, the most populous city in South Carolina, is the principal seaport and greatest commercial center of the South Atlantic States; and is one of the leading rice and cotton markets in the Union. Pop., 49,984. Area of South Carolina, 34,000 sq. m. Pop., 995,708.

55. Savannah is the chief seaport, and next to the largest city in Georgia; has a fine harbor and extensive railroad connections, and is next to Charleston as a commercial center. Atlanta is the largest city in Georgia, having a population of 37,409. Population of Savannah, 30,709. Area of Georgia, 58,000 sq. m. Pop., 1,542,304.

56. Jacksonville—the largest city in Florida—Key West, and Pensacola, are the chief commercial centers of the

state. Key West does a large business in the collection and export of sponges, and in turtle fishing. Pensacola is the market for the Perdido lumber region, and is the location of a United States navy yard. Jacksonville has a population of 10,500. Key West, 9,890. Pensacola, 4,800. Area of Florida, 59,300, sq. m. Pop., 269,673.

57. Mobile, the largest city in Alabama, has a fine harbor and extensive railroad connections; and is the second cotton market in the United States. Montgomery, the state capital, is one of the chief markets for the interior, and has a large trade in cotton and other agricultural produce. Population of Mobile, 29,132. Montgomery, 16,714. Area of Alabama, 50,700 sq. m. Pop., 1,262,718.

58. Vicksburg is the largest and most important city in Mississippi. Immense quantities of cotton make this their place of shipment. Natchez, Columbus, and Jackson are the chief centers of trade, their principal business being the shipping of cotton to New Orleans or Mobile. Jackson is the state capital, and has a population of 4,500. Population of Vicksburg, 11,814; Natchez, 7,058. Columbus, 3,400. Area of Mississippi, 47,200 sq. m. Pop., 1,133,505.

59. Galveston, the chief seaport, and most populous city of Texas, has one of the best harbors on the Gulf; is connected by railroad with the interior of the state and with St. Louis, and is rapidly increasing in importance. Pop., 22,248. Area of Texas, 274,000 sq. m. Pop., 1,592,877.

60. Memphis, the most important, and second city in population in Tennessee, is the terminus of several principal railroads; the largest grain and cotton market between St. Louis and New Orleans. Pop., 33,592. Nashville is the most populous city in Tennessee, having 43,350 inhabitants. Area of Tennessee, 45,600 sq. m. Pop., 1,542,736.

61. Little Rock is the capital, and most populous city in Arkansas. Helena and Fort Smith are the chief centers of trade. At Hot Springs are warm mineral springs, highly esteemed for their medicinal qualities. Population of Little Rock, 13,185. Helena, 2,500. Fort Smith, 2,400. Hot

Springs, 6,500. Area of Arkansas, 52,200 sq. m. Pop., 802,853.

62. Louisville, the largest city in Kentucky, is situated at the head of the rapids of the Ohio, around which a canal has been cut. It is one of the great commercial centers of the Mississippi basin, and is, after New Orleans, the most populous city south of the Ohio and the Potomac. It has a large trade, especially in flour, pork, hemp, and tobacco. Pop., 123,758. Area of Kentucky, 37,700 sq. m. Pop., 1,648,690.

63. Indianapolis, the capital, and largest city of Indiana, is situated near the center of the state on the west fork of White River. It is a great railroad center, and one of the mort important and rapidly growing cities of the Central States. Pop., 75,056. Area of Indiana, 33,800 sq. m. Pop., 1,978,576.

64. Detroit, the largest and most important city in Michigan, is situated on the west bank of Detroit River, seven miles below Lake St. Clair. It is the greatest commercial center in the state; has a large trade with the copper region of the northern peninsula, and with parts on the lower lakes and the St. Lawrence. The chief articles of trade are grain and lumber. Pop., 116,340. Area of Michigan, 56,500 sq. m. Pop., 1,644,186.

65. Milwaukee, the largest city in Wisconsin, and on one of the best harbors of Lake Michigan, is the chief commercial center of the state. It is a great wheat market, and has a large trade in other farm produce, in lumber, and in bricks. Pop., 115,587. Area of Wisconsin, 53,900 sq. m. Pop., 1,318,674.

66. St. Paul, the capital, and next to the most populous city of Minnesota, is situated on the east bank of the Mississippi, at the head of navigation, and about 2,200 miles from the mouth of the river. Numerous railway lines center here; it has a large river trade, and considerable manufactures; great wholesale trade, which is rapidly increasing, and an excellent graded system of public schools. Pop., 41,473.

Minneapolis is the most populous city in Minnesota, having a population of 46,887 inhabitants. Area of Minnesota, 83,500 sq. m. Pop., 783,097.

67. Dubuque, the largest city in Iowa, is situated on the Mississippi River. Manufacturing and commerce are the chief interests. It is the market of the Iowa lead region, the richest part of which is within a few miles of the city. Dubuque is also an important center for the distribution of goods, the wholesale trade of the city extending over all the northern part of the state, and even into the adjoining states and territories. Pop., 22,254. Area of Iowa, 55,000 sq. m. Pop., 1,625,114.

68. Leavenworth, the most populous city in Kansas, is situated on the right bank of the Missouri River, above the mouth of the Platte River. It has an important trade by river and railroad; several lines center here. There are saw-mills, machine-shops, breweries, founderies, and other manufactories. Leavenworth has long been distinguished for the excellence and efficiency of its public-school system. Pop., 16,550. Area of Kansas, 81,300 sq. m. Pop., 996,911.

69. Omaha is the chief city of Nebraska, and is situated on the Missouri River, above the mouth of the Platte River. The city is connected with Council Bluffs, in Iowa, by a steam ferry and by a great railroad bridge. The manufactories are important and constantly increasing. The smelting and refining of metals is extensively carried on, the annual production of lead, silver and gold amounting to more than $2,000,000. There are also extensive shops and works of the Union Pacific Railway, which give employment to a large number of men. Pop., 30,518. Area of Nebraska, 76,000 sq. m. Pop., 452,637.

70. Portland contains the greatest number of inhabitants in the state of Oregon. It is situated on the Willamette River, and is the chief center of trade. Pop., 17,598. Area of Oregon, 95,300 sq. m. Pop., 185,372.

71. Virginia City, the largest city in Nevada, is famous for its rich mines of silver. A single vein of one of these

mines is said to have recently yielded over $22,000,000 in fourteen months. Pop., 13,705. Carson City, the capital, is situated in a valley of considerable fertility. Pop., 4,227. Area of Nevada, 104,000 sq. m. Pop., 62,266.

72. Denver, the capital, and most populous city of Colorado, is the largest city between the Missouri River and the Pacific coast. It is the western terminus of the Kansas Pacific railroad, and is connected with the Union Pacific by a branch terminating at Cheyenne. It is remarkable for the rapidity of its growth. Pop., 35,629. Area of Colorado, 106,000 sq. m. Pop., 195,093.

73. Tahlequah is the capital and principal town of the Cherokee nation. And the place at which the council of the tribes meets, from time to time, to devise measures for the general good. Pop., 2,500. Area of Indian Territory, 69,000 sq. m. Pop., 68,000.

74. Washington Territory lies north of Oregon. The soil in the valleys is fertile, and the climate mild for the latitude. The capital is Olympia, and has a population of 3,500 inhabitants. In the number and excellence of its bays and harbors it is not surpassed. The principal export is lumber. Area of Washington Territory, 70,000 sq. m. Pop., 82,708.

75. Idaho Territory adjoins Oregon and Washington on the west. On the east are the Bitter Root and the Rocky Mountains. The country at the head of Salmon River, is rich in gold. Boisé City is the capital. Pop., 3,000. Area of Idaho Territory, 86,000 sq. m. Pop., 36,-154.

76. Montana Territory lies east of Idaho, and adjoins British America on the north. It has a fine climate, much rich soil, and great mineral wealth. The source of the Missouri River is in the Rocky Mountains, in Montana, which pass through this Territory. Helena is the capital and largest city, having a population of 5,600 inhabitants. Area of Montana Territory, 144,000 sq. m. Pop., 42,587.

77. Dakota Territory lies east of Montana. It is an

organized territory with a small population, but rapidly becoming settled by emigrants from the States. Yankton, a small town on the Missouri, is the capital. Pop., 2,300. Area of Dakota Territory, 151,000 sq. m. Pop., 136,809.

78. Wyoming Territory lies west of Dakota and Nebraska, and south of Montana. The surface in the central part is very mountainous. Along the rivers the soil is fertile. Coal, iron, copper, and gold are found. Cheyenne is the capital. Pop., 3,600. Area of Wyoming Territory, 98,000 sq. m. Pop., 21,842.

79. Utah Territory lies south of Idaho and east of Nevada. The greater part of the land is sandy and barren. Utah is remarkable as the home of the Mormons, or Latter-day Saints; they constitute four-fifths of the population. Their religion has many peculiarities, the most important of which is polygamy. The Mormons occupy fertile valleys at the western base of the Wahsatch range, and carry on an extensive agriculture by means of irrigation. Salt Lake City is the capital and largest city, having a population of 20,768 inhabitants. Area of Utah Territory, 84,500 sq. m. Pop., 145,271.

80. Arizona Territory lies east of California and Nevada, and south of Utah. The climate is salubrious; and in many portions of the Territory the soil is fertile. Arizona has a small population. Its rich mines of gold and silver are as yet but little worked. The Indians are of various tribes, among them the Apaches and Utes are the most hostile toward the whites. Prescott is the capital. Pop., 1,500. Area of Arizona Territory, 114,000 sq. m. Pop., 80,724.

81. New Mexico Territory lies south of Colorado and west of Texas. The white inhabitants are mostly of Spanish origin, and speak the Spanish language. The population of the Territory has increased but little during the thirty-five years that it has been a part of the United States. There are as yet neither manufactures, railroads, nor common schools. Santa Fe is the capital and largest city, contain-

ing a population of 7,000 people. Area of New Mexico Territory, 121,000 sq. m. Pop., 129,394.

82. A series of rapids called "Muscle Shoals."

83. A reef is a chain of rocks lying near the surface of the water. Keys are small rocky islands.

84. About 20,000 miles.

85. The Ohio and Erie Canal, from Cleveland to Portsmouth.

86. A canal around the rapids of St. Mary's River, which obstructs navigation between Lakes Superior and Huron.

87. A canal connecting the Fox and Wisconsin Rivers.

88. A communication between the Mississippi and the Great Lakes.

89. Principally on the western slope of the Sierra Nevada.

90. In Rogue's River Valley, and east of the Cascade Range.

91. Near the principal tributaries of the Lewis River.

92. In the Washoe Region, west of Carson River. There are mines, also, near Humboldt, Reese, and Walker Rivers.

93. In the basins of the Gila and Lower Colorado.

94. They are from 10,000 to 14,000 feet in height.

95. To the Great Falls, a distance of 2,575 miles from its junction with the Mississippi.

96. On the head-waters of the Missouri and Clarke Rivers.

97. In the central part of the state, among the mountains.

98. About 450 miles.

99. For the mineral springs in its vicinity.

100. All the country between the Isthmus of Tehuantepec and the Isthmus of Panama.

101. The five independent republics—Guatimala, Honduras, San Salvador, Nicaragua, and Costa Rica, together with the British colony of Balize, or British Honduras.

102. Volcano Agua is noted for its irruptions of hot water, one of which overwhelmed the city of Old Guatimala.

103. All the Caribbee Islands, south of 15° north latitude, are called Windward Islands.

104. Because they face the trade winds, which there blow constantly from the east.

105. The Leeward Islands are those islands extending from 15° north latitude, north-west to Porto Rico.

106. Guanahani is noted as being the first land seen by Columbus in the New World, and was discovered on Friday, October 12th, 1492.

107. The western part is the Republic of Hayti, the capital of which is Port au Prince; The eastern part is the Republic of Dominica, the capital of which is St. Domingo.

108. Volcano Aconcagua is the loftiest peak in America, being 23,910 feet high.

109. There are more than 2,000,000 square miles.

110. Potosi. It is situated at the foot of a mountain consisting mainly of silver ore, and was once largely engaged in silver mining. Potosi is the most elevated city in the world, being 13,330 feet high.

111. Rio Janeiro, Buenos Ayres, Santiago, Bahia, Pernambuco, Lima, and Valparaiso.

112. They form the central part of the Scandinavian Mountains in Norway.

113. London, Paris, Berlin, Vienna, St. Petersburg, Moscow, and Constantinople.

114. The Promontory of Gibraltar. It has the strongest fortress in the world, and belongs to Great Britain.

115. The Island of Corsica is the birthplace of Napoleon Bonaparte, the celebrated soldier and Emperor of France.

116. By the treaty of Vienna, in 1864, Denmark lost the duchies of Sleswick, Holstein, and Lauenburg.

117. A canal between Amsterdam and Helder, enabling

vessels to avoid the danger and delay of navigating the Zuyder Zee.

118. Amsterdam is built on wooden piles driven into the soil, and is divided into two parts by the Amstel, and intersected by numerous canals, which form ninety islands, joined by two hundred and fifty bridges.

119. The Ionian Islands, most of the Cyclades, with Negropont, and several smaller islands.

120. Mecca, situated near the Red Sea, is renowned as the birthplace of Mohammed, who founded the religion which bears his name, and is visited annually by thousands of pilgrims.

121. Irkoutsk is the center of the overland trade between Russia and China.

122. Lake Sirikol, the source of the Amoo River, on the table-land of Pamir—15,600 feet above the level of the sea.

123. The valley of the Jordan is remarkable for its great depression, the surface of the Dead Sea being more than 1,400 feet below that of the Mediterranean Sea.

124. The Runn of Cutch is a barren tract, alternately sand and water.

125. Canton, Siangtan, Singan-fu, Tschantschau-fu, Tientsin, Tschingtu-fu, and Foochow.

126. The length of the United States, exclusive of Alaska, is about 2,800 miles, and its breadth, 1,500 miles.

127. Napoleon Bonaparte was imprisoned there from 1815 until his death, in 1821.

128. Alexandria is the chief commercial city of Africa.

129. Cairo is the principal seat of the Turkish government in Africa.

130. England is about one-sixtieth as large, or about the size of Wisconsin.

131. It is by the nearness of the Japan current, which brings the warm waters of the Torrid Zone.

132. Europe is about one-tenth larger.

133. Asia contains about four times as many square miles, and two and a half times as many inhabitants.

134. There are three—Monarchy, Aristocracy, and Democracy. These modes of government may in various ways be modified.

135. A Monarchy is a government in which the supreme power is in the hands of a monarch.

136. An Aristocracy is a government in which the supreme power is vested in a privileged order.

137. A Democracy is a government in which the supreme power is in the hands of the people.

138. Missouri, from its source to the Gulf of Mexico, 4,100 miles; Mississippi, proper, 2,800; Mackenzie, 2,300; St. Lawrence, 2,000; Arkansas, 2,000; Rio Grande, 1,800.

139. The descent of the cataract of Niagara is about 165 feet.

140. Amazon, 3,600; Rio de la Plata, from the head of the Parana, 2,250; Parana, 2,000; Madeira, 2,000; Orinoco, 1,500; San Francisco, 1,300.

141. The United States.

142. The Rocky, Andean, Californian, Brazilian, Parime, and Alleghanian.

143. Because the rains from the Pacific Ocean are of rare occurrence, and the height of the Andes range prevents the rain-clouds from the east.

144. The Volga, 2,400; Danube, 1,725; Dnieper, 1,230; Kama, 1,400; Don 1,000; Rhine, 950.

145. Nearly 230 miles.

146. South America extends twelve and a half degrees north of the equator.

147. With the exception of Lake Titicaca and Lake Maracaibo, they are more like vast morasses than lakes.

148. Lake Titicaca is a saltish lake, about half as large as Lake Erie, and is situated on the Great Plateau, nearly 13,000 feet above the level of the Pacific Ocean. Its waters are inland, having no outlet to the ocean. Lake Maracaibo

is, properly speaking, a bay, being connected by a strait with the Caribbean Sea.

149. Yang-tse-Kiang, 2,880; Lena, 2,400; Yenesei, 2,800; Amoor, 2,200; Obe, 2,320; Hoang-Ho, 2,280.

150. New York, Pennsylvania, New Jersey, and Delaware.

151. In Porto Rico and Cuba.

152. Cuba is about the size of Pennsylvania, and Hayti is nearly half as large as Michigan, containing 28,000 square miles.

153. They are in central and southern Russia.

154. In her commerce, manufactures, and mining.

155. She surpasses every other country in the world. The principal manufactures are those of wool, cotton, and iron.

156. The chief article of fuel in Ireland is peat, or bog turf, of which there are over 3,000,000 acres.

157. Cuba, Porto Rico, the Balearic Islands, and a part of the Philippine, Ladrone, Cardine, and the Canary Islands.

158. Cape May, Long Branch, and Atlantic City.

159. Nile, 3,600; Niger, 2,600; Zambezi, 1,800; Senegal, 1,200; Orange, 1,000; Gambia, 700.

160. Australia is nearly four-fifths as large as the United States.

161. Mining and raising wool.

162. New York contains 47,000 square miles, and Pennsylvania 46,000.

163. Alaska has an area of 577,000 square miles, or more than ten times that of Illinois. The climate is very cold, and, with the exception of the southern point, it is unfit for civilization. In the northern part the coast is low and marshy, while in the south it is mountainous. About 500 whites and 70,000 Indians and Esquimaux constitute the inhabitants.

164. It may be, for there are extensive forests of pine and other timber, valuable deposits of minerals, great numbers of fur-bearing animals, and almost inexhaustible fisheries.

165. The government is administered by an Executive appointed by the President of the United States.

166. Asia is more than 4,000,000 square miles larger.

167. The Desert of Sahara is from 750 to 1,200 miles wide, and 3,000 miles in length.

168. Helena, Olympia, Boisé City, Yankton, Salt Lake City, Cheyenne, Prescott, Tahlequah, and Santa Fe.

169. This name is given to that part of the great railroad west of the Missouri River. It passes through the southern part of Nebraska, up the valley of the Platte River, touching the northern boundary line of Colorado, and the southern part of Wyoming, through northern Utah and Nevada, and thence through California to the Pacific coast.

170. Omaha, Fremont, Columbus, Kearney, Julesburg, Cheyenne, Laramie, and Ogden.

171. Wisconsin, Illinois, Kentucky, Tennessee, and Mississippi on the east, and Minnesota, Iowa, Missouri, Arkansas, and most of Louisiana on the west.

172. Kentucky and West Virginia from Ohio, Indiana, and Illinois.

173. The climate of Europe varies somewhat in the same latitude. In eastern Europe the winters are excessively cold, while the summers are very hot. On the shores of the Atlantic the warm ocean current renders the climate mild and moist.

174. Russia, Austria, Germany, and Turkey are empires; Great Britain, Norway, Sweden, Holland, Denmark, Spain, Portugal, Italy, Belgium, and Greece are kingdoms; France and Switzerland are republics.

175. Nearly 1,400 miles. These grains consist of rye, oats, and barley.

176. The Russian Empire, in extent, is the largest in the world, and comprizes fully one-half of Europe, and more than one-third of Asia.

177. They are divided into four classes: 1. The nobles. 2. The clergy. 3. The merchants. 4. The recently emancipated serfs.

178. Scotland is divided by the Grampion Hills into the Highlands and Lowlands. The Lowlands lie south, and the Highlands north, of the mountains.

179. It is exceedingly irregular, and abounds in fine harbors and roadsteads.

180. France contains nearly as many square miles as Spain and Holland combined, and more than three times the area of Portugal, Switzerland, and Denmark.

181. She is one of the richest and most powerful. The position of the country and the fertility of the soil give it great commercial and agricultural advantages.

182. The great influence of fashions.

183. Italy was the central part of the Roman Empire, and ruled all the known world.

184. Greece was in advance of all other nations in civilization and learning; and was the birthplace of many renowned orators and philosophers.

185. The United States is about four times as large.

186. They are divided into the Atlantic Slope, the Pacific Slope, and the Central Plain.

187. The region which extends from the Alleghany Mountains to the Atlantic Ocean and Gulf of Mexico.

188. The region which lies between the Rocky Mountains and the Pacific Ocean.

189. The Mississippi Valley, the Texas Slope, the Basin of the St. Lawrence, and the small valley of the Red River of the North.

190. Into seven divisions: The St. Lawrence Basin, Atlantic Slope, Mississippi Valley, Texas Slope, Pacific Slope, inland Basin of Utah, and Red River.

191. South America excels all other continents in the number and magnitude of its rivers; but, as the continent is very sparsely populated, the navigable streams flow through vast and almost unbroken solitudes.

192. In the production of salt, tin, iron, coal, and lead.

193. They are used for milling, drainage, and commerce.

194. China is little more than one-fourth as large as the United States, and contains nearly 421,000,000 people.

195. Cheese, pork, cotton, wheat, and machinery.

196. Coffee, tea, dry-goods, wool, and sugar.

197. The horizon is that part of the heavens which appears to come in contact with the earth.

198. The government of Persia is a tyrannical monarchy. The supreme ruler is called a shah.

199. Because lakes of this order lose water by evaporation only, and retain the salt and other materials carried into them by their affluent rivers.

200. The most important ones are tea, rice, and silk.

201. Central Asia has the climate of the Temperate Zone. It is subject to great extremes of heat and cold; and, except near the shores of the Pacific Ocean, is dry, for the mountain system intercepts the warm and moist winds of the Indian Ocean. Southern Asia has the climate of the Torrid Zone.

202. Siberia has long been used as a place of banishment for exiles and criminals.

203. Yucatan and Old California. Yucatan is noted for its ruins of ancient cities and temples.

204. They are divided into the wet and dry. The rainy season continues from May to October, and the dry from October to May.

205. New Hampshire has but eighteen miles of sea-coast.

206. It might be difficult to determine what the exact influence upon the earth's climate would be, but during the yearly revolution of the earth the entire surface would come directly perpendicular to the sun's rays, and become torrid. When one pole would come perpendicular to the sun's rays, the other would unavoidably be in darkness, and frigid. The length of the longest day at the equator would be twenty-four hours, and would happen every six months. By this, it would give at the equator four zones in one year—two torrid and two temperate zones.

207. Russia, Germany, France, Austria, and Great Britain.

208. Tobacco—Kentucky. Wheat—Illinois. Rice—South Carolina. Cotton—Mississippi. Sugar—Lousiana. Corn—Illinois. Sweet potatoes—Georgia.

209. South Carolina is called the Palmetto State, on account of the great number of palmetto trees which grow there.

210. Constantinople, Madrid, Peking, Denver, Indianapolis, Philadelphia, Columbus, and Springfield.

211. Horses—Illinois. Mules—Alabama. Sheep—Ohio. Swine—Illinois. Cattle—Texas.

212. The Missouri River is very rapid in its course, and is much larger than the Mississippi above, and is navigable to the Great Falls, above Ft. Benton, where there are some of the grandest cataracts in the world.

213. Marble is obtained from the extensive quarries in Vermont and Italy; and is also found in the states of Maine, Massachusetts, and Rhode Island.

214. Gold—California. Silver—Colorado. Lead—Illinois. Pine lumber—Michigan. Turpentine—North Carolina. Copper—Michigan. Coal—Pennsylvania. Iron—Pennsylvania.

215. The Geysers, or boiling springs. There are nearly fifty of these hot springs which occupy an area not exceeding twelve acres. And some of them are so powerful that they throw up water, and even large stones, to a great height.

216. It was called Iceland by a Norwegian pirate, who, on his first visit, saw a bay filled with ice, which had floated there from Greenland.

217. Italy was formerly divided into a number of states, but, after a prolonged struggle, the efforts of the people to obtain national unity were successful, and the whole country is now united under a liberal and enligtened government.

218. Nijni Novgorod is near the central part of Russia. A great fair is held there every year, which is attended by thousands of people, who come from different parts of Europe and Asia, to buy and sell goods.

ORTHOGRAPHY.

QUESTIONS.

1. What is Orthography?
2. What is a letter?
3. How many elementary sounds in the English language?
4. How are they divided?
5. What are vocals?
6. What are subvocals?
7. What are aspirates?
8. What is phonology?
9. What is orthoepy?
10. How is voice produced?
11. How are the letters divided?
12. What are the organs of speech?
13. What are vowels? Consonants?
14. What is spelling?
15. What is language?
16. What is spoken language?
17. What is written language?
18. How are the consonants divided?
19. What is called a proper sound?

20. What is called an irregular sound?
21. How many sounds has *a*?
22. How many sounds has *e*?
23. What letters are the vowels?
24. How many sounds has *i*?
25. How many sounds has *o*?
26. How many sounds has *u*?
27. How many sounds have *w* and *y*?
28. How many irregular sounds has *a*?
29. How many irregular sounds has *e*?
30. How many irregular sounds has *i*?
31. How many irregular sounds has *o*?
32. How many irregular sounds has *u*?
33. How many irregular sounds has *w*?
34. How many irregular sounds has *y*?
35. What letters are the consonants?
36. How many sounds has *b*? *c*?
37. How many sounds has *d*? *f*?
38. How many sounds has *g*? *h*? *i*?
39. How many sounds has *j*? *k*? *l*?
40. How many sounds has *m*? *n*? *p*?
41. How many sounds has *q*? *r*? *s*?
42. How many sounds has *t*? *v*? *w*?
43. How many sounds has *x*? *y*? *z*?
44. Mention the sounds of the proper diphthongs.
45. Mention the sounds of the double vowels.
46. What are simple sounds?
47. What is a proper diphthong?
48. What is called a combination?
49. What is a double consonant?
50. How are the sounds of the letters divided?
51. Mention some of the combinations.
52. What sounds has *ch*? *sh*?
53. What sounds has *th*? *ng*?
54. What sounds has *gh*? *ph*?
55. What is a syllable?
56. What is a mute? Name them.

57. What are the liquids?

58. In the formation of the consonant sounds, how many classes are given them?

59. How are the labials formed?

60. How are the dentals made?

61. What are the linguals?

62. How many palatals, and how are they made?

63. What is accent?

64. What are cognates?

65. What is a triphthong? Digraph?

66. What are the words of one, two, three, four, or more syllables called?

67. By what is the principal sound in every syllable produced?

68. To what does every consonant belong?

69. What is syllabication?

70. When two vowels come together, how are they disposed of in syllabication?

71. What is the guide for arranging words into syllables?

72. How may words be divided at the end of lines?

73. Why are words divided into syllables?

74. When is the hyphen used?

75. When is one letter a substitute for another?

76. What properties do a substituted letter assume?

77. Which letters have no substitute?

78. When is *i* a consonant?

79. Which letters have no sound of their own?

80. What is a prefix? Suffix? Root?

81. What is a simple word? Compound word?

82. What is a primitive word?

83. What is a derivative word?

84. What would be the consequences if final *e* was not silent.

85. Which letters are never silent?

86. Is *u* ever a consonant?

87. What is the use of silent letters?

88. In what words is *ch* silent?
89. In what words is *s* silent?
90. When is *gh* silent?
91. When is final *e* silent?
92. In how many ways are words made known?
93. Is *m* ever silent?
94. When is *w* silent?
95. When is *p* silent?
96. When is *n* silent?
67. When is *t* silent?
98. When is *l* silent?
99. When is *k* silent?
100. When is *h* silent?
101. When is *d* silent?
102. When is *c* silent?
103. When is *g* silent?
104. When is *b* silent?

NOTE.—If the teacher or student will carefully drill on the *sounds* of the letters given in this branch, a fair knowledge of Orthography may be obtained.

ORTHOGRAPHY.

ANSWERS.

1. Orthography is the art or practice of writing words with the proper letters, according to common usage; spelling.

2. A letter is a mark or character used as the representative of a sound, or of an articulation of the human organs of speech.

3. There are forty-five.

4. They are divided into three classes—vocals, subvocals and aspirates.

5. Vocals consist of pure tone or vocality; there are twenty of them.

6. Subvocals are imperfect tones, being formed of pure tone and breath united; there are fifteen subvocals.

7. Aspirates have no tone or vocality, being formed of breath alone; there are ten aspirates.

8. Phonology is a treatise on sounds, or the science of the elementary sounds uttered by the human voice in speech, including its various distinctions or sub-divisions of tones.

9. Orthoepy is the art of uttering words with propriety.

10. Voice is produced by the action of the breath upon the larynx.

11. The letters are divided into vowels and consonants.

12. The organs of speech are the lips, the teeth, the tongue, and the palate.

13. Vowels are letters that denote pure tones. Consonants are letters that cannot be fully uttered without the aid of a vowel sound.

14. Spelling is the act of writing or printing words with their proper letters.

15. Language is a medium for the communication of thought. It is principally comprehended in two divisions, called spoken and written.

16. Spoken language consists of significant sounds uttered by the human voice to express thought.

17. Written language is a system of characters used by common consent to represent spoken language.

18. The consonants have three divisions formed from the whole– as single letters and combinations; mutes and semi-vowels; subvocals and aspirates.

19. A sound which properly belongs to a letter is called its proper sound, as the sound of *s* in *so.*

20. When a letter represents the proper sound of another letter, it is called its irregular sound, as the sound of *s* in *is.*

21. It has six proper sounds: the first or long sound, as in *ape;* second, the grave sound, as in *arm;* third, the broad sound, as in *all;* fourth, the short sound, as in *at;* fifth, as in *care;* sixth, as in *ask.*

22. It has three proper sounds: the first or long sound, as in *me;* second, the short sound, as in *met;* the third sound, that between *e* in *met* and *u* in *urge*, as in *her.*

23. The vowels are: *a*, *e*, *i*, *o*, *u*, *w*, and *y;* *i*, *u*, *w*, and *y* are sometimes consonants.

24. It has two proper sounds: the first or long sound, as in *ice;* second, the short sound, as in *it.*

25. It has three proper sounds: the first or long sound, as in *old;* second, the flat sound, as in *do;* third, the short sound, as in *on.*

26. It has four proper sounds: the first or long sound, as in *mute;* second, the short sound, as in *up;* third, the close sound, as in *full;* fourth, the same sound, as in *urge.*

27. They have no proper sound.

28. It has two: the third sound of *o*, as in *what;* the second sound of *e*, as in *many.*

29. It has one: the first sound of *a*, as in *they.*

30. It has two: the sound of *e* in *verge*, as in *sir;* second, the first sound of *e*, as in *machine.*

31. It has four: the second sound of *u*, as in *love;* the third sound of *u*, as in *wolf;* the fourth sound of *u*, as in *word;* and the third sound of *a*, as in *for.*

32. It has three: the second sound of *e*, as in *bury;* the second sound of *i*, as in *busy*; and the second sound of *o*, as in *rude.*

33. It has one: the first sound of *u*, as in *few.*

34. It has four: the first sound of *i*, as in *type;* the second sound of *i*, as in *hymn;* the third sound of *e*, as in *myrtle;* and the first sound of *e*, pronounced faintly, or the second sound of *i*, as in *truly.*

35. The consonants are: *b*, *c*, *d*, *f*, *g*, *h*, *j*, *k*, *l*, *m*, *n*, *p*, *q*, *r*, *s*, *t*, *v*, *x*, *z*, and *i*, *u*, *w*, and *y*, when not vowels.

36. It has one proper subvocal sound, as in *book.* *C* has no proper sound; it has three irregular sounds: the sound of *k*, as in *cup;* the sound of *s*, as in *city;* and the sound of *z*, as in *suffice.*

37. *D* has one proper subvocal sound, as in *do.* It has the sound of *t* at the end of some words, as *vexed.* *F* has one proper aspirate sound, as in *fan;* it also has the sound of *v*, as in *of.*

38. *G* has one proper subvocal sound, as in *go;* it also has the sound of *j*, as in *gem.* *H* has one proper aspirate

sound, as in *hat*. *I* has the consonant sound of *y*, as in *clothier*.

39. *J* has one proper subvocal sound, as in *joy*. *K* has one proper aspirate sound, as in *keep*. *L* has one proper subvocal sound, as in *let*.

40. *M* has one proper subvocal sound, as in *man*. *N* has one proper subvocal sound, as in *no*. *P* has one proper aspirate sound, as in *pen*.

41. *Q* has no proper sound; it represents the sound of *k*, as in *question*. *Q* is always followed by *u*, and the combination *qu* has the sound of *kw*. *R* has one proper subvocal sound, as in *run*. *S* has one aspirate sound, as in *so*; it also has three irregular sounds: the first sound of *z*, as in *is*; the second sound of *z*, as in *measure*; and the sound of *sh*, as in *sure*.

42. *T* has one proper aspirate sound, as in *ten*. *V* has one proper subvocal sound, as in *vain*. *W* has one proper subvocal sound, as in *way*.

43. *X* has no proper sound; it has the sound of *ks* in English words, as in *vex*; the sound of *z* in Greek proper names, as in *Xenophon*; the sound of *z* in some French words, as in *beaux*; and the sound of *gz*, as in *exist*, *example*. *Y* has one proper subvocal sound, as in *you*. *Z* has two regular subvocal sounds: the first, as in *zeal*; the second, as in *azure*.

44. *Ou* and *ow* have one and the same sound, as in *out*, *cow*. *Oi* and *oy* have one and the same sound, as in *boil*, *boy*.

45. *Oo* has no proper sound; it has four irregular sounds: the first sound of *o*, as in *door*; the third sound of *u*, as in *book*; the second sound of *o*, as in *boon*; and the second sound of *u*, as in *blood*. *Ee* has no proper sound; it has the first sound of *e*, as in *tree*, and the second sound of *i*, as in *been*.

46. Simple sounds are generally represented by single letters; but some are represented by combinations of letters,

and sometimes a single letter represents a combination of sounds.

47. A proper diphthong is two vowels in the same syllable, with their sounds closely blended together. They are: *oi*, *oy*, *ou*, and *ow*.

48. A vowel and consonant united and representing a single sound, are called a combination. They are: *ce*, *ci*, *si*, and *ti*.

49. Two consonants united in one syllable and representing a single sound, are called a double consonant. They are: *ch*, *sh*, *th*, *ng*, *gh* and *ph*.

50. The sounds of the letters are divided into proper and irregular.

51. *Ce* and *ci* have one sound, the sound of *sh*, as in *ocean*, *social*. *Si* has two sounds: the sound of *sh*, as in *version*; the second sound of *z*, as in *fusion*. *Ti* has one sound, the sound of *sh*, as in *nation*.

52. *Ch* has one proper aspirate sound, as in *chair*; it has one irregular sound, the sound of *sh*, as in *chaise*. In many words the *h* is silent, and the *c* sounded like *k*, as in *character*.

53. *Th* has two proper sounds: the first or aspirate sound, as in *thin*; the second or subvocal sound, as in *this*; *Ng* has one proper subvocal sound, as in *song*.

54. *Gh* has no proper sound; it has the sound of *f*, as in *tough*, and the sound of *k*, as in *hough*. *Ph* has no proper sound; it has the sound of *f*, as in *phase*.

55. A syllable is a word, or part of a word, which may be pronounced with one impulse of the voice.

56. A mute is a letter which admits of no escape of breath while the organs of speech are in contact. They are: *b*, *p*, *d*, *t*, *k*, *c*, and *g* hard.

57. The liquids are *l*, *m*, *n*, and *r*, and are so called because of their soft sound, which easily unites with the sounds of other letters.

58. Four are given: *labials*, *dentals*, *linguals*, and *palatals*.

59. The *labials* are made by the lips, and are *b*, *f*, *m*, *p*, *v*, *w*, and *wh*. The lips are assisted by the teeth in making the sounds of *f* and *v*.

60. The *dentals* are made through the teeth, and are, *j*, *s*, *z*, *ch*, *sh*, *zh*, and *c* and *g* soft.

61. The *linguals* are made by the tongue, and are, *d*, *l*, *n*, *r*, *t*, *y*, *th* aspirate, and *th* subvocal.

62. They are made by the palate, and are, *k*, *q*, *x*, *ng*, and *c* and *g* hard.

63. Accent is a superior force of voice on some particular syllable of a word.

64. Cognates are letters whose elements are produced by the same organs in a similar manner, as *f* and *v*. The aspirates (except *h*) are all cognates of some of the subvocals.

65. A triphthong is the union of three vowels in the same syllable, two of which are silent. A digraph is the union of two vowels in the same syllable, one of which is silent.

66. They are called monosyllables, dissyllables, trisyllables, and polysyllables.

67. By the vowel, except it be in unaccented syllables with *e* as the vowel sound.

68. Every consonant in a word belongs to some vowel or diphthong, unless it is silent.

69. Syllabication is the division of words into syllables.

70. Unless it should be a diphthong, two syllables must be formed, or they may be used together with one vowel silent.

71. They must be arranged precisely as they are heard in correct pronunciation.

72. They should be divided between the syllables.

73. They are divided so as to assist in the pronunciation of words.

74. The hyphen is used between compound words when first formed, or when little used; between syllables at the end of lines; and between syllables for the purpose of instruction.

75. When it has the sound that another letter usually represents.

76. Those of the letter which it represents.

77. The letters *b*, *d*, *g*, *h*, *l*, *m*, *n*, *p*, *r*, *th*, and *wh*.

78. It is a consonant when it begins a syllable and is immediately followed by a vowel sound, as in *alien*.

79. The letters *c*, *x*, and *q*.

80. A prefix is a letter or letters joined to the beginning of a word. A suffix is a letter or syllable added to the end of a word. The root is the principal word without prefix or suffix.

81. A simple word is one that is not composed of two or more whole words. A compound word is composed of two or more simple ones.

82. A primitive word is one that is derived from no other word.

83. A derivative word is one that is formed from a primitive, by means of prefixes or suffixes.

84. Two syllables would be formed for one.

85. The letters *f*, *j*, *q*, *r*, *x*, *v*, *z*.

86. It is when preceded by *g* or *s*, and immediately followed by a vowel sound; also a substitute for *w*, as in *language*.

87. The use is to modify the sounds of other letters.

88. In the words *schism*, *yacht*, and *drachm*.

89. In the words *isle*, *belleslettres*, *corps*, *viscount*, and *island*.

90. It is silent after *i* in the same syllable, as in *neigh*, *fright*; also after *au* and *ou*, as in *bought*, *ought*, *through*, *aught* and *slaughter*.

91. It is silent when another vowel precedes it in the same syllable; as in *made*, *ice*, *bride*, and *grape*.

92. Words are made known in two ways: first, as simple or compound; second, as primitive or derivative.

93. It is silent in the words *mnemonic*, *mnemonical*, and *mnemonics*.

94. It is silent before *r* in the same syllable, as in *wreck*

and *wrap*. It is also silent in the words *sword*, *whole*, *whoop*, and *answer*.

95. It is silent before the words *psalter*, *psalm*, and *pneumonia*.

96. It is silent after *l* and *m*, as in *column*, *solemn*, and *kiln*.

97. It is silent before *ch* in the same syllable, as in *botch*, *latch*, and *thatch*; also in *mortgage*, *Christmas*, and *eclat*.

98. It is silent after *a*, when followed by *f*, *k*, *m*, or *v* in the same syllable (except *valve*), as in *half*, *palm*, *folks*, *salve*, and *stalk*. *L* is also silent in *could*, *would*, and *should*.

99. It is silent before *n* in the same syllable, as in *knack*, *knee*, *knap*, and *knarl*.

100. It is silent after *g* or *r* in the same syllable, as in *ghost*, *rheumatism*, *rhyme*; when it is final, following a vowel, as in *ah*, *oh*, *Jehovah*; when it is initial, it is silent in some words, as in *herb*, *honest*, *hour*, *heir*; in *phthisic*, *isthmus*, *asthma*, *Thomas*, *Thames*, it follows *t*, and is silent.

101. It is silent before *g* in the same syllable, as in *fledge*, *pledge*, *dredge*, and *bridge*.

102. It is silent before *k* in the same syllable, as in *rack*, *back*, *luck*, and *tuck*; also in *indict*, *muscle*, *czar*, *victuals*, etc.

103. It is silent before *m* or *n* in the same syllable, as in *gnat*, *malign*, *phlegm*, and *design*.

104. It is silent before *t* or after *m* in the same syllable, as in *comb*, *tomb*, *subtle* and *debt*.

RULES FOR SPELLING.

Rule I.—The letters *f* and *l*, at the end of monosyllables, and standing immediately after single vowels, are generally doubled; as in *cliff*, *staff*, *doff*, *puff*, *all*, *bell*, *hill*, *toll*, and *null*. The words *clef*, *if*, *of*, *pal*, and *sol* are exceptions.

Rule II.—Words ending in *e* silent, generally drop that letter upon adding a syllable commencing with a vowel; as

in *blame*, *blamable*; *expanse*, *expansable*; *fleece*, *fleecy*; *membrane*, *membranous*. *Exception.*—When, by this rule, *c* or *g* would precede *a* or *o*, the *e* is retained, in order to preserve the soft sound of these letters; as in *charge*, *chargeable*; *peace*, *peaceable*; *courage*, *courageous*.

Remark.—Though the suffix should commence with a consonant, the *e* is often omitted, if it is silent and preceded by a vowel; as, *awe*, *awful*; *true*, *truly*.

Rule III.—Monosyllables and words accented on the last syllable, when they end with a single consonant, preceded by a single vowel, double their final consonants before a suffix that begins with a vowel; as, *fan*, *fanning*; *remit*, *remitting*; *begin*, *beginning*.

Rule IV.—A consonant standing at the end of a word immediately after a diphthong or double vowel, is never doubled; *ail*, *peat*, *haul*, *door*, and *maim*, are examples.

The word *guess* is only an apparent exception, as the *u* does not strictly form a diphthong with the *e*, but serves merely to render the *g* hard.

Rule V.—When words ending in *y* after a consonant receive a suffix, the *y* is changed into *i*, and sometimes into *e*; as in *fly*, *flies*; *empty*, *emptiness*; *glory*, *glorious*; *beauty*, *beauteous*.

If the *y* is not preceded by a consonant, it is generally not changed; as in *decay*, *decays*; *day*, *days*; *money*, *moneys*; *gay*, *gayety*.

Rule VI.—If a suffix commences with *i*, the *y* is retained, in order to prevent the repetition of the *i*; as, *fly*, *flying*; *die*, *dying*; *tie*, *tying*.

Rule VII.—Derivatives formed by prefixing one or more syllables to words ending in a double consonant, commonly retain both consonants; as, *tipstaff*, *rebuff*, *befall*, *inthrall*, *foretell*, *fulfill*, etc.

Rule VIII.—The plurals of a few nouns ending in *f* or *fe* are irregularly formed by changing *f* or *fe* into *ves*; as, *life*, *lives*; *knife*, *knives*; *leaf*, *leaves*; *sheaf*, *sheaves*, etc.

Rule IX.—Derivatives formed by appending a sylla-

ble beginning with a vowel to words ending with a vowel sound, generally retain the letter or letters representing such sound; as, *agree*, *agreeable*, *agreeing*; *weigh*, *weighing*; *echo*, *echoed*; *beau*, *beauish*.

Rule X.—Compound words formed by joining two or more words generally retain all the letters of the simple words; as, *well-bred*, *stiff-necked*, *dull-eyed*, *wide-mouthed*, *save-all*.

Rule XI.—The plural of the proper nouns ending in *y* preceded by a consonant, is formed by changing *y* into *ies*, according to the rule; as, "The three *Maries*." Many writers, however, form the plural of such words by simply adding *s*; as, "The three *Marys*."

Rule XII.—When the singular of a noun ends in *y* preceded by a vowel (except *u* having the power of *w*), the plural is regularly formed by adding *s* only; as, *day*, *days*; *key*, *keys*; *money*, *moneys*; *alloy*, *alloys*. Some plurals of the latter class are often inaccurately written with the termination *ies*; as, *monies*, *attornies*, and the like.

PHYSICAL GEOGRAPHY.

QUESTIONS.

1. What is Physical Geography?
2. What is Mathematical Geography?
3. What is Political Geography?
4. How many large planets are there?
5. Name the eight large planets.
6. How far is the moon from the earth?
7. How far is the sun from the earth?
8. How far is the nearest star from the earth?
9. What two motions has the earth?
10. What is meant by the earth's orbit?
11. What is the length of the earth's orbit?
12. What facts prove that the earth is spherical?
13. What is the exact form of the earth?
14. What is an *oblate spheroid?*
15. Into what is every circle divided?
16. What is the equator?
17. What is the meridian circle?
18. What is the difference between a great circle and a small circle?
19. What is a meridian?

20. What is the circumference of the earth?
21. What is the diameter of the earth?
22. What is the equatorial diameter? Polar diameter?
23. What is meant by the latitude of a place?
24. What is meant by the longitude of a place?
25. How many miles are there in a degree of latitude?
26. How many miles in a degree of longitude?
27. What are the polar circles?
28. What are the tropics?
29. What are zones?
30. Name the zones, in order, beginning at the north.
31. What is the circle of illumination?
32. What causes the change of seasons?
33. What would follow if the earth's axis were perpendicular to the plane of the ecliptic?
34. At how great an angle is the earth's axis inclined?
35. What is meant by a day, as a division of time?
36. What is a solar year?
37. What is the length of day and night at the equator?
38. What is the length of the longest day at the poles?
39. What is established regarding each of the six days of the creation?
40. What new appearance marked each era?
41. What does the earth appear at one time to have been?
42. How was a crust formed from this molten mass?
43. How was the great primeval ocean formed?
44. How were eruptions and convulsions produced?
45. What changes followed during the lapse of ages?
46. What were then called into being?
47. After plants, what were created?
48. What forms of animal life appeared first?
49. From whence do we derive our knowledge of the plants and animals of the geological ages?
50. What is a rock?
51. How may rocks be divided?

52. What are stratified rocks?

53. Mention some of them.

54. What are unstratified rocks?

55. To what do igneous rocks owe their origin?

56. What is mentioned as an example of the igneous rocks?

57. What are metamorphic rocks?

58. What are veins?

59. How many great ages are distinguished by geologists? Name them.

60. Which is the earliest age?

61. What rocks belong to this age?

62. Name the second great age.

63. What rocks, plants, and fossils belong to this period?

64. Which was the third great age?

65. Name the fourth age.

66. What were formed during this age, and how?

67. Of what did the animals of the carboniferous age mainly consist?

68. What age succeeded the carboniferous? By what was it marked?

69. What rocks belong to the reptilian age?

70. Which was the sixth of the great ages?

71. Name some of the gigantic quadrupeds of this age.

72. What was the character of the plants of the mammalian age?

73. Mention the characteristics of the age of man.

74. What are the principal agents in producing changes on the earth's surface?

75. How do the winds produce changes of surface?

76. How are changes made by the ocean?

77. In what two ways are rivers constantly changing the earth's surface?

78. What effect has the action of the Niagara River on the rocky wall over which it falls?

79. How much earthy matter is annually discharged by the Mississippi?

80. What is the area of the earth's surface?

81. What are lowlands? Deserts?

82. What are silvas? Prairies?

83. Of what does the Desert of Sahara consist?

84. What is a mountain? Hill?

85. Of what is the interior of Australia supposed to consist?

86. What is a volcano? Mountain-chains?

87. State some of the uses of mountains.

88. What is the loftiest mountain in North America?

89. For what is Pike's Peak noted?

90. What are the highest peaks of the Rocky Mountains?

91. What is an avalanche? A water-shed?

92. What is a delta? A confluence?

93. What is the highest peak of the Andes Mountains?

94. What is one of the most celebrated peaks of the Andes Mountains?

95. What is a mountain pass?

96. What does the Mammoth Cave contain?

97. How are volcanoes distinguished?

98. What are extinct volcanoes?

99. What are active volcanoes?

100. What catastrophe occurred A. D. 79?

101. How many eruptions of Mt. Etna are recorded?

102. Describe the eruption of Coseguina in 1835.

103. What is the second class of volcanic phenomena?

104. Of what do earthquakes consist?

105. How many lives are they estimated to have destroyed?

106. By what signs is an earthquake generally preceded?

107. For what was the year 1868 remarkable?

108. Where else did a terrible earthquake occur in 1868?

109. Give an account of the earthquake at Lisbon.

110. Give an account of the earthquake at New Madrid.
111. What is water?
112. How many oceans are there really?
113. What grand divisions does the Atlantic separate?
114. What is the extent of the Pacific?
115. How is the Indian Ocean situated?
116. How is the Arctic Ocean situated?
117. How is the Antarctic Ocean situated?
118. How is the bottom of the ocean diversified?
119. What is the greatest depth shown by soundings?
120. What is the estimated mean depth of the whole body of the ocean?
121. What is the color of the ocean?
122. What is phosphorescence?
123. By what is it produced?
124. What is constantly going on in the ocean?
125. How many oceanic movements are distinguished?
126. What are waves? Tides?
127. By what are tides produced?
128. Why are not the tides always of the same height?
129. What are currents?
130. Name the principal currents.
131. Of these, which is the most important?
132. What peculiarity in the water of the Gulf Stream?
133. What is the width and velocity of the Gulf Stream?
134. What is the color of the Gulf Stream?
135. What is the influence of the Gulf Stream on the climate of western Europe?
136. Describe the equatorial current of the Atlantic.
137. Describe the equatorial currents of the Pacific.
138. Describe the Japan current.
139. Give an account of the Antarctic currents, flowing into the Atlantic, the Pacific, and the Indian Oceans.
140. Give an account of the Arctic currents.
141. What are whirlpools?
142. By what names are the inland waters of the earth known?

143. What is a spring?
144. Why are most inland waters fresh?
145. By what is the earth surrounded?
146. What property has air, owing to the earth's attraction?
147. How does air compare with water in weight?
148. To what is air essential?
149. What is climate?
150. What are isothermal lines?
151. What is the snow-line?
152. What is wind?
153. Mention some of the uses of winds.
154. What is the cause of winds?
155. How are the trade-winds produced?
156. What are the most remarkable variable winds?
157. What are whirlwinds?
158. What are sand-pillars?
159. Under what circumstances is dew formed?
160. What is hoar-frost, and how is it formed?
161. What are clouds? Vapors?
162. How many classes of clouds, and what are their names?
163. Describe the cirrus.
164. Describe the stratus.
165. Describe the cumulus.
166. Describe the nimbus.
167. Under what circumstances are rain, snow, and hail precipitated?
168. What is snow? Hail?
169. Mention some of the uses of snow.
170. What is lightning?
171. What is heat-lightning?
172. How is thunder produced?
173. Why do we see the lightning before we hear the thunder?
174. Where are thunder-storms most frequent?
175. What is the aurora borealis?

176. How is it supposed to be produced?
177. What is mirage?
178. What are meteors?
179. What is zoology?
180. How many principal divisions of animals are there?
181. Name and define them.
182. Where does the musk-deer live?
183. Where is the Cashmere goat found?
184. Where does the elephant live?
185. What is ethnology?
186. What is the population of the globe supposed to be?
187. How many races are there that are recognized, and what are the names?
188. Of whom are the Germanic nations descendants?
189. Where do the Romanic nations live?
190. From whom have the Italians derived their origin?
191. From whom have the Spanish and Portuguese sprung?
192. How many languages are spoken on the earth?
193. What language is spoken by the greatest number?
194. How many religious systems prevail on the earth?
195. In what does the Christian believe?
196. What does the Jewish faith recognize?
197. What is the distinctive feature of the Mohammedan faith?
198. In what do the Pagans believe?
199. Where are minerals found?
200. Name the most important metals.
201. What is the value of the gold now in circulation?
202. What is the amount of silver at present in circulation.
203. What silver mines are the richest in the world?
204. Where is iron found in the greatest abundance?
205. Where are the great lead mines of the United States?
206. Where are the richest copper mines in the world?

207. What animal products of the United States are among the most important?

208. How do the United States compare with other countries in mineral resources?

209. How do the United States rank as regards precious stones?

210. Where is the principal supply of petroleum obtained?

211. How much coal was produced in 1860?

212. How much lead is produced every year?

213. How great was the yield of copper in 1869?

214. Where does zinc occur?

215. How much zinc is annually produced?

216. What sandstone quarries are particularly valuable?

217. When was the first petroleum well sunk?

218. What region produces the principal supply of salt?

219. How much salt was produced in 1860 in the United States

PHYSICAL GEOGRAPHY.

ANSWERS.

1. Physical Geography is that science which treats of the earth's surface as composed of land and water, the atmosphere, climate, the mineral kingdom, and all animal and vegetable life.

2. Mathematical Geography treats of the form, magnitude, and motions of the earth, the modes of representing its surface by maps and globes, and the imaginary lines by which the position of places is determined.

3. Political Geography treats of the earth as inhabited by man, and divided by him into different countries, with their cities and towns, their customs, religion, and government.

4. There are eight.

5. The eight large planets, in the order of their distance from the sun, are as follows: Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, and Neptune.

6. The moon is 240,000 miles from the earth.

7. The sun is over 91,000,000 miles.

8. The nearest star, the sun excepted, is 19,000,000,000,000 miles away, while the more distant ones are so re-

mote that light, though it travels with the prodigious velocity of 186,000 miles in a second, is 50,000 years in coming from them to our planet.

9. The diurnal motion, or that around its axis, and the annual motion, or that in its orbit around the sun.

10. The earth's orbit is the path which the earth takes in its revolution around the sun.

11. The length of the earth's orbit is about 577,000,000 miles.

12. (*a.*) People have traveled around the earth. (*b.*) On the ocean, which must show the exact shape of the earth, the upper part of an approaching object is seen first. When a ship comes in sight, the tops of the masts are first seen, then the sails, and lastly the hull. (*c.*) The shadow of the earth on the moon is always circular. (*d.*) The north star rises as we travel north, and declines as we go south, till we reach the equator, when it disappears. (*e.*) Actual measurement.

13. The earth is an oblate spheroid.

14. An oblate spheroid is a body having the polar diameter shorter than the equatorial.

15. Every circle, whether great or small, is divided into 360 equal parts, called degrees.

16. The equator is a great circle equally distant from the poles.

17. The meridian circle is any great circle passing through the poles.

18. The great circle divides the earth's surface into two equal parts; a small circle, into two unequal parts.

19. The meridian is half of a meridian circle, extending from pole to pole.

20. The circumference of the earth is the distance round it, and measures about 25,000 miles.

21. The diameter of the earth is a straight line passing through its center, and terminating in opposite points of its surface.

22. The equatorial diameter extends from any point on

the equator to the opposite point, and is about 7,925½ miles long. The polar diameter extends from pole to pole, and thus coincides with its axis. Its length in miles is 7,899. Their difference of length, about 26½ miles, is owing to the flattening of the earth, which brings each pole 13¼ miles nearer the center than are the points that lie on the equator.

23. The latitude of a place is its distance from the equator, measured on its own meridian. Latitude is either north or south, and is reckoned in degrees (from 0 to 90), minutes, and seconds. The latitude of places on the equator is 0.

24. The longitude of a place is its distance from some given meridian, measured on its own parallel. Longitude is either east or west, and is reckoned in degrees (from 0 to 180), minutes, and seconds. The given meridian from which longitude is reckoned, is called the first meridian.

25. Every degree of latitude is equal to about 69¼ statute miles.

26. A degree of longitude, at the equator, is also about 69¼ statute miles; but, north or south of the equator, it becomes less and less as the meridians approach each other, and at the poles, where they meet, it is nothing.

27. The polar circles are the two parallels 23½ degrees from each pole. The northern polar circle is called the Arctic Circle; the southern, the Antarctic Circle.

28. The tropics are the two parallels 23½ degrees north and 23½ degrees south of the equator. The northern tropic is called the Tropic of Cancer; the southern, the Tropic of Capricorn.

29. Zones are belts of the earth, bounded by the polar circles and the tropics.

30. (*a.*) The North Frigid, which lies north of the Arctic Circle, and is 23½ degrees wide. (*b.*) The North Temperate, which lies between the Arctic Circle and the Tropic of Cancer, and is 43 degrees wide. (*c.*) The Torrid, which lies between the tropics, and is 47 degrees wide. (*d.*) The South Temperate, which lies between the Tropic of Capricorn and the Antarctic Circle, and is 43 degrees wide. (*e.*)

The South Frigid, which lies south of the Antarctic Circle, and is 23½ degrees wide.

31. The circle of illumination is the great circle which separates the light side of the earth from the dark.

32. The change of seasons is produced by the earth's revolution around the sun, in connection with the fact that its axis is constantly inclined to the plane of the ecliptic, and always points in the same direction.

33. There would be no change of seasons; the circle of illumination would always be identical with some meridian circle. The sun's rays, reaching from pole to pole, would fall on each point of the earth's surface at the same angle throughout the year, and days and nights would everywhere be of twelve hours duration.

34. The earth's axis is constantly inclined to the plane of the ecliptic at an angle of about 66½ degrees.

35. It is the period in which the earth makes one rotation on its axis. It is divided into 24 hours, which are subdivided into minutes and seconds.

36. A solar year is the period in which the earth makes one revolution round the sun; it contains 365 days, 5 hours, 48 minutes, and 46 seconds.

37. At the equator the days and nights are always 12 hours long; the farther a point lies from the equator, the longer are its longest day and its longest night.

38. At the poles the year is made up of but one day and one night, each lasting six months. All places in about 66½ degrees of latitude, north or south, have one day in the year 24 hours long, and one night of equal length.

39. It seems to be established that each of the six days of Creation was an era—a period not of 24 hours, but of centuries, during which great changes and new appearances took place.

40. The appearance of light marked the first of these eras; that of the sky separating the vapors above from the waters below, the second; that of the earth rising from the waters, and afterward bringing forth grass, and herb, and

tree, the third. In the fourth era, the sun, moon, and stars appeared for the first time in the sky; the fifth era was marked by the creation of fishes and birds; the sixth by that of beasts, and finally of man, for whose abode the earth was prepared by these successive changes.

41. The earth appears at one time to have been an intensely heated molten ball, surrounded by a hot atmosphere filled with vapors and gases.

42. By degrees the outer part of this molten mass gave out its heat into space, and portions of its matter became solid as they cooled. As the cooling proceeded, these solid masses grew larger, and at last blended in a thin crust.

43. The vapor in the atmosphere was next condensed, and thus was formed the great primeval ocean, covering the whole globe.

44. From time to time this mighty ocean would break through weak places in the crust, and pour in on the seething mass below. Great volumes of steam would then be formed, which would rend the solid barriers above it, and force through the openings thus made floods of melted rock, to flow over the earth, and, in course of time, cool down into a new mineral deposit.

45. In the lapse of ages, innumerable changes of this kind occurred on the surface. Continents were upheaved; and the waters finally subsided into the hollow places, carrying with them and depositing a sediment of rocky matter. The crust gradually became thicker, the surface assumed a form comparatively permanent, and only occasional eruptions showed that fiery heat and waves of molten rock still raged within.

46. A succession of plants, marking distinct eras of vegetable life.

47. Different orders of animals were then created—living and preying upon each other, and dying, as they do now.

48. The most simple forms of animal life appeared first; then those of a higher organism; and, finally, man, created in the image of God.

49. Our knowledge of the plants and animals of the geological ages preceding the creation of man, is derived from their remains dug out of the earth, and hence called fossils.

50. A rock, in geology, is any natural formation of earthy or stony material, whether in the form of sand, gravel, clay, mould, or a compacted mass.

51. In regard to their form and position, the rock masses of the earth's crust may be divided into three classes—stratified rocks, unstratified rocks, and veins.

52. Stratified rocks are those that lie in layers, or strata. They compose the greater part of the land surface of the earth, forming not only vast plains, but whole mountain systems.

53. To this class belong slate, sandstone, limestone, marl, chalk, etc.

54. Unstratified rocks are irregular masses, formed, not by the deposit of sediment in beds or layers, but by the gradual cooling of melted matter. They embrace igneous and metamorphic rocks.

55. Igneous rocks owe their origin to the action of heat, as the stratified rocks do to that of water.

56. Basalt may be mentioned as an example of the igneous rocks. In some regions it constitutes immense beds, and in others forms gigantic columns, as regular as if wrought by art.

57. Metamorphic rocks are such as were originally stratified, but afterward underwent a change of structure through the agency of heat or chemical action.

58. Veins are rock-matter filling the cracks or fissures of other rocks. They vary greatly in size and extent. They may be regular or irregular in form, isolated or united in a complex network.

59. There are *seven great ages*, or divisions of time. They are known as the Azoic, the Silurian, the Devonian, the Carboniferous, the Reptilian, the Mammalian, and the Age of Man.

60. The Azoic Age is the oldest; it was the era, as its name implies, when there was no life, either vegetable or animal, on the globe.

61. The crystalline minerals and all the igneous rocks date back to this age, and hence they are destitute of fossils.

62. The Silurian Age is second in antiquity. During this period there was no terrestrial life; but mollusks—animals with soft, fleshy bodies, without any internal skeleton, like the oyster and the snail—abounded in the waters; and hence this is sometimes called the age of mollusks.

63. The oldest sandstone and limestone belong to this period. Its plant-fossils are sea-weeds.

64. The Devonian Age is third. This was the age of fishes remarkable for their thick, bony scales. The sea also teemed with shells, corals, and sea-weed; while the land, though yet limited in extent, began to be covered with vegetation. Insects, the earliest of terrestrial animals, now first appeared.

65. The Carboniferous Age, or age of coal, is fourth.

66. From colossal tree-ferns, leaves, and branches, deposited in successive centuries, were formed, by gradual decomposition under water, those vast coal-beds on which the industrial pursuits of the present day so largely depend.

67. They consisted mainly of insects of various kinds, and inferior tribes of reptiles.

68. The Reptilian Age. It was marked by the great number, variety, and size of its reptiles—the appearance and habits of which are known from the remains found buried in the rocks of this period.

69. The rocks of this age are the freestones extensively used for building, sandstone formations intersected with ridges of trap of igneous origin, limestone, and gypsum, laminated and plastic clays, and chalk-beds containing layers of flint.

70. The Mammalian Age was the sixth. The reptiles now dwindled in size and diminished in number, being

succeeded by quadrupeds, some of which were much larger than any modern species.

71. The deinotherium, mastodon, megatherium, and fossil elephant.

72. The plants of that age resembled those of the present time. Palms, oaks, maples, magnolias, etc., were found in the forests.

73. The Age of Man is the last of the seven geological ages. The huge monsters that gave the preceding period its peculiar character became extinct, and were replaced by smaller animals—those we see around. Man was created, and invested with dominion over the earth. This is the "era of the finished world—the era, also, of man's progress and preparation for another and a higher life."

74. The principal agents in producing these changes are the winds, the ocean, the rivers, and the forces at work within the earth.

75. The winds transport loose sand, particularly on coasts exposed to their fury, and, driving it inland, heap it up in parallel ridges. Such sand-hills, or *downs*, as they are called, are very common near the ocean; on the coast of England they have buried houses and farms.

76. The waves of the ocean are continually changing the outline of its coasts, by wearing away the rocks exposed to their action.

77. First, by wearing passages through the strata over which they flow; and by bearing incalculable quantities of earthy matter to the sea, to form new deposits at their mouths.

78. The rocky wall over which the Niagara River precipitates itself, is constantly wearing away under the impact of 700,000 tons of water every minute; so that the falls are gradually receding toward Lake Erie—at a rate variously estimated at from 1 foot to 1¼ yards every year. They were once, and that, too, within the present geolog-

ical period, at least four miles nearer to Lake Ontario than they now are.

79. It is computed that the Mississippi carries annually into the Gulf of Mexico 400,000,000 tons of earthy matter—enough to cover an area of ten square miles to the depth of twenty-five feet.

80. The earth's surface has an area of about 197,000,000 square miles.

81. Lowlands are tracts, either level or diversified by hill and vale, not elevated more than 1,000 feet above sea-level. Deserts are extensive tracts destitute of water, and, consequently, of vegetation and animal life.

82. Silvas are forest plains. Plains that produce grass, but not trees, are known in North America as prairies; in South America as llanos and pampas; in Asia and south-eastern Europe as steppes.

83. The desert of Sahara, as far as known, consists partly of table-lands and partly of low plains. It is interspersed with *oases*, or fertile spots, which are generally lower than the surrounding country; some of these are of considerable extent and well populated.

84. A mountain is an elevation of land exceeding 2,000 feet in height. A hill is less than 2,000 feet in height.

85. The interior of Australia is but little known, many lives having been lost in attempts to explore it. It is supposed, however, to consist mainly of desert table-lands of moderate elevation, with low plains in parts.

86. A volcano is a mountain or opening in the earth's crust through which issue fire, smoke, ashes, lava, steam, etc. A mountain-chain is a long, elevated ridge, or several mountains extending in a line.

87. Mountains are of great use to man. They attract the clouds, condense their moisture, and store up in reservoirs the water received from them, sending it forth again in streams, from thousands of springs, to fertilize the soil. They increase the surface of the earth, giving variety to its vegetable productions. They protect the adjacent coun-

tries from cold and piercing winds, and thus exert a favorable influence on their climate.

88. Mount St. Elias, on the boundary between Alaska and British America, and is 17,900 feet high.

89. Pike's Peak is noted for the rich gold deposits in its neighborhood.

90. The highest peaks of this chain are Mounts Brown and Hooker, in British America, about 15,700 feet high.

91. An avalanche is a large mass of snow, ice, and earth, sliding or rolling down a mountain. A water-shed is the mountain-chain or ridge of land which separates one basin from another, and from which the rivers flow.

92. A delta is the lowland between the several mouths of a river. A confluence is the junction of two or more rivers.

93. The highest peak of the Andes is Mount Aconcagua, which rises 23,910 feet above sea-level.

94. The most celebrated peak of the Andes is Chimborazo, in Ecuador, about 1½ degrees south of the equator. It has an elevation of 21,424 feet, and was long regarded as the highest mountain of the whole system.

95. A mountain pass is an elevated road crossing a mountain-chain through a natural opening or depression.

96. The Mammoth Cave, in Kentucky, contains a subterranean lake called the "Dead Sea," which is some thirty feet deep, and has a navigable river for its outlet.

97. Volcanoes may be distinguished as extinct and active.

98. Extinct volcanoes are such as are now at rest, but were subject to eruptions in former ages, as is shown by their form and structure, and the presence of craters.

99. Active volcanoes are such as are either in a constant state of eruption, or have eruptions from time to time, with intervals of rest.

100. A terrific eruption of Mt. Vesuvius destroyed the flourishing cities of Pompeii, Herculaneam, and Stabiæ,

and covered them with ashes and cinders to the depth of fifteen feet.

101. About sixty of its eruptions are recorded. In 1669, a stream of lava from this mountain overflowed the ramparts of Catania, sixty feet in height, and destroyed a portion of the city. In 1832, several craters opened in the sides of the mountain, and a stream of lava eighteen miles long, one mile broad, and thirty feet deep, poured over the adjacent fields.

102. In 1835, a terrible eruption occurred. It lasted three days, during which the light of the sun was obscured over half of Central America; more than 40,000 square miles are said to have been covered with dust, ashes, and lava.

103. The second class of volcanic phenomena are earthquakes.

104. Earthquakes consist of vibrations or tremblings of the earth's crust, and are caused by movements in the fluid interior; but how these movements are produced, is as yet unknown.

105. It is estimated that since the creation, earthquakes have destroyed 13,000,000 human beings.

106. An earthquake is generally preceded by unmistakable signs. The electrical condition of the air seems to be changed perceptibly to both men and beasts—the former experiencing oppression and dizziness; the latter uttering cries of distress, running wildly about, or otherwise manifesting uneasiness. The atmosphere is unnaturally still and hazy, and the sun seen through it looks like a ball of fire.

107. The year 1868 was remarkable for the number and severity of its earthquakes. One of these occurred in the Sandwich Islands, destroying whole villages and many lives.

108. One of the most terrible earthquakes on record occurred in South America, in August, 1868. Its center of activity seems to have been at Arica, a seaport of Peru, which was completely destroyed, with 200 of its inhabi-

tants. The shocks extended throughout the Andes, from the United States of Columbia to Chili, and towns and cities were laid in ruins. It is estimated that more than 50,000 persons lost their lives by this catastrophe.

109. The great earthquake of Lisbon occurred November 1st, 1755. A rumbling sound beneath the surface was immediately followed by three shocks, so close together that they seemed but one, which threw down the principal part of the city; the sea retired, leaving the bar dry, and instantly returned in a wave forty feet high, engulfing a great marble quay, to which multitudes had fled to escape the falling buildings. In the space of six minutes, 60,000 persons perished.

110. The most remarkable earthquake that has occurred in the United States is that of New Madrid, on the Mississippi, in 1811–12. For several months there was an incessant quaking of the ground, which for a distance of 300 miles rose and sank in undulations. The most of the town was submerged.

111. This all-important and ever-present liquid is a chemical combination of two gases, oxygen and hydrogen—eight parts of the former by weight being combined with one of the latter. When pure, it is destitute of color, taste, and smell; but, as it readily absorbs gases and dissolves many solids, it is seldom found in this state.

112. There is really but one ocean; but the continents partially divide it into five basins, which we distinguish by different names, as the Atlantic, Pacific, Indian, Arctic, and Antarctic Oceans.

113. The Atlantic separates America from Europe and Africa, and comprises about 25,000,000 square miles. Its length is about 9,200 miles; its width varies from 800 miles —between Greenland and Norway—to 3,600 miles—between Florida and the African coast.

114. The Pacific is the largest of the oceans, containing over 70,000,000 square miles, or about half of the entire water surface of the globe. It extends from Behring Strait

to the Antarctic Circle, a distance of 9,200 miles, and is nearly 10,000 miles in width.

115. The Indian Ocean extends southward from Asia, between Australia and Africa, to the Antarctic Circle, which separates it from the Antarctic Ocean; its area is nearly 25,000,000 square miles.

116. The Arctic Ocean, the area of which is estimated at 3,000,000 square miles, surrounds the north pole, and is bounded by the northern coasts of Europe, Asia, and America.

117. The Antarctic Ocean surrounds the south pole; its northern boundary is the Antarctic Circle, which separates it from the Atlantic, Pacific, and Indian Oceans. As it encloses lands inaccessible on account of ice, its exact extent is unknown.

118. The bottom of the ocean is diversified with depressions and elevations—with low plains, plateaus, and mountains—like the land; hence the depth differs in different parts.

119. The greatest depth shown by soundings is eight and three-quarter miles.

120. The mean depth of the whole body of the ocean is estimated at four miles.

121. The color of the ocean is a beautiful sky-blue where the depth is great, but in shallow water, yellowish tints, reflected from the bottom, mingle with the blue, and produce a grayish green.

122. Phosphorescence, one of the most beautiful of marine phenomena, is a brilliant light occasionally observed in the sea during dark nights, particularly in tropical regions. Sometimes the crests of the waves, the spray thrown up by a ship's bow, and the wake she leaves behind, look as if they were on fire.

123. Phosphorescence is produced by myriads of animalcules, which have the property of emitting light from their bodies, like fire-flies; a hundred of them have been found in a single drop of sea-water.

124. The great body of the ocean is never at rest; not only is the surface agitated by the winds, but even at great depths the water moves from one region to another.

125. There are four, viz.: waves, tides, currents, and whirlpools.

126. Waves are ridges of water, produced by the friction of winds on the surface. Tides are alternate risings and fallings of the waters of the ocean.

127. Tides are produced by the attraction of the moon and sun—principally that of the former—acting with different degrees of force on different parts of the earth.

128. Were the moon the sole cause of the tides, they would always be of the same height; but the sun also exerts an attraction, which, according as it acts with or against that of the moon, increases or diminishes the height of the tide.

129. The currents are vast streams which traverse the ocean, and keep its waters in perpetual circulation.

130. The principal currents are the Gulf Stream, the Equatorial, Japan, Antarctic, and Arctic currents.

131. The most important of the oceanic currents is the Gulf Stream, so called from the Gulf of Mexico, out of which it flows into the Atlantic, through the Strait of Florida.

132. The water is much warmer than other parts of the ocean near it.

133. The Gulf Stream is from 25 to 150 miles in width, and moves with a velocity of from 1½ to 5 miles an hour.

134. The Gulf Stream is of a deep indigo blue, strikingly different from the green of the surrounding ocean.

135. A branch of this vast body of warm water, constantly flowing past the western coast of Europe, exerts a most genial influence on the climate. Even many miles in the interior the air is tempered by west winds, warmed by contact with this great stream.

136. The Equatorial current crosses the Atlantic from the coast of Africa to the neighborhood of Cape St. Roque.

It there divides into two branches, a northwesterly and a southwesterly, each of which follows the South American coast—the former making its way into the Caribbean Sea and the Gulf of Mexico.

137. In the Pacific two equatorial currents are found—one north and the other south of the equator. The former, turning to the northeast near the Loo Choo Islands, continues under the name of the Japan current. The south equatorial current of the Pacific consists of two branches, one of which, striking the Australian coast, divides into a northwesterly and a southwesterly branch, as does the Atlantic equatorial current on the coast of Brazil; the other, farther north, turns near the Caroline Islands, and reverses its course, crossing the Pacific again in a direction nearly due east to South America, under the name of the Equatorial counter-current.

138. The Japan current in the Pacific bears a remarkable resemblance to the Gulf Stream in the Atlantic. Impelled by the Pacific equatorial current, it sweeps from the China Sea along the Asiatic island chains, in a northeasterly direction toward the Aleutian Islands and Alaska, the climate of which it improves, as the Gulf Stream does that of northwestern Europe. Between the Japan current and the main land a cold current sets in the opposite direction, as in the case of the Gulf Stream.

139. The Antarctic current which enters the Atlantic runs in a northwesterly direction to the southern extremity of Africa, and thence along its western coast until it joins the equatorial near the Gulf of Guinea. That which sets into the Pacific flows along the South American coast under the name of the Peruvian or Humboldt current, and is merged in the equatorial west of the Gulf of Guayaquil. The Antarctic current belonging to the Indian Ocean runs along the western coast of Australia, and unites with the Equatorial just north of the Tropic of Capricorn.

140. From the Arctic Ocean two cold currents set to the south, one on each side of Greenland. Uniting at the

mouth of Davis Strait, they continue their southerly course as far as Newfoundland, where part of this broad Arctic river, as an under-current, flows beneath the Gulf Stream; and the rest, as a surface-current, keeps inside of this stream, close to the American shore as far south as Florida.

141. Whirlpools are circular currents, which occur in certain localities.

142. The inland waters of the earth are springs, rivers, and lakes.

143. A spring is a natural outflow of water, bubbling up from an opening between rocks, or issuing from the earth as a stream.

144. When water evaporates, all impurities are left behind; hence rain-water is not salt, like the ocean. The water of springs, rivers, and lakes is, therefore, pure and fresh, unless it comes in contact with foreign matter that it is capable of dissolving.

145. The earth is surrounded by an elastic fluid called air, which enters the minutest pores, and therefore exists in every substance.

146. Air, like everything else, is attracted by the earth; hence it has weight.

147. Experiments show that air is 815 times lighter than water.

148. Air is essential to the transmission of sound, to combustion, and to life.

149. Climate is the state of the atmosphere in regard to temperature, winds, moisture, and salubrity.

150. Isothermal lines are lines connecting places that have the same mean temperature.

151. There is a line or limit of elevation, above which the surface is covered with perpetual snow; this is called the snow-line.

152. Wind is air in motion.

153. Winds have a purifying effect upon the atmosphere; they dissipate unhealthy exhalations; they transport vapors from the sea to moisten and fertilize the land; they

carry the seeds of plants far and wide, and thus extend the empire of vegetation; finally, they waft our ships, and are, in some countries, made available as a motive power for machinery.

154. The cause of winds is the difference of heat received from the sun in different places. The heated air expands, becomes rarefied, and rises. The cooler air immediately rushes in from the surrounding parts, to restore the disturbed equilibrium.

155. The trade-winds are produced as follows: The equatorial regions being most intensely heated, a current of rarefied air is there constantly ascending, while colder currents from the north and south set in toward the equator to fill its place. When these reach the ascending current, having in turn become rarefied, they follow it in its upward course, and thus air is withdrawn from the higher latitudes, and accumulated in the equatorial regions.

156. The most remarkable variable winds are whirlwinds and hurricanes, typhoons or cyclones.

157. Whirlwinds are bodies of air that have a rotatory or spiral motion, and are usually caused by the meeting of contrary winds.

158. When a whirlwind occurs on a sandy plain or desert, great quantities of fine sand are carried up to a great height in the atmosphere, and move with the revolving body of air, forming what are called sand-pillars.

159. When air charged with moisture comes in contact with a solid surface colder than itself, aqueous vapor is precipitated on this surface as dew.

160. If, during the precipitation of dew, the temperature falls to the freezing point (32° F.), hoar-frost is formed. This consists of minute ice-crystals, and is nothing more than frozen dew.

161. Clouds are collections of visible vapor suspended in the atmosphere, at altitudes ranging from one to five miles. Vapor consists of particles of water so fine and light that they float in the air like dust.

162. There are four classes, viz.: the cirrus, stratus, cumulus, and nimbus.

163. The cirrus, which is the highest cloud we see, is of a light, feathery form, and, on account of its elevation, its vapors probably exist in light particles of snow.

164. The stratus exists generally in the night and in winter; it is formed by the cooling and consequent settling down of the higher clouds, which appear in horizontal bands.

165. The cumulus is the summer-day cloud which forms at sunrise by the gathering together of the night mists.

166. The nimbus is the rain or snow cloud, and presents the appearance of a dense black or gray sheet.

167. When the minute vapor-particles of clouds combine and grow too heavy to float in the air, they are precipitated as rain—or, at a temperature below the freezing point, as snow or hail.

168. Snow is frozen vapor, with its particles aggregated in flakes. Hail is frozen rain.

169. Snow is an important agent in the economy of nature. Being a non-conductor of heat, it protects the roots of the grasses and winter grains from severe frosts. Collecting in great masses on lofty mountains and gradually thawing, it feeds streams, which carry fertility and wealth to extensive districts.

170. Lightning is a discharge of atmospheric electricity, accompanied by a flash of light.

171. Heat-lightning is either the reflection of distant flashes on the clouds, or the frequent and therefore weak and silent discharge of electricity from the clouds through a moist atmosphere.

172. Lightning cleaves the air with inconceivable rapidity, and leaves a vacuum behind it, into which the surrounding air rushes with great force, and with a loud, crackling sound, which we call thunder.

173. Lightning and thunder take place at the same instant, but we see the former before we hear the latter; this

is because light travels with much greater velocity than sound.

174. Thunder-storms are most frequent within the tropics during the rainy season.

175. The aurora borealis is a luminous appearance, which at times imparts wonderful beauty to the polar skies at night, and is also of occasional occurrence in the temperate latitudes.

176. It is supposed to be produced by the passage of electric currents through strata of highly rarefied air.

177. Mirage is the appearance in the air of the image of some distant object, seen either in connection with the object itself, above or below the latter, or suspended in the air, the object being invisible.

178. Meteors are luminous bodies which are seen darting through the sky, sometimes leaving behind them a train of light.

179. Zoology is that science which treats of animals, their structure, habits, and classification.

180 There are four principal divisions of animals, based on distinct types of structure, and including all the denizens of the earth, the water, and the air.

181. (*a.*) Radiates, or such as are shaped like a star or flower, and have their organs arranged uniformly round a center. (*b.*) Mollusks, or such as consist of a soft, fleshy body of simple form, usually protected by a shell, like the oyster or snail. (*c.*) Articulates, or such as consist of a series of joints, and have no internal skeleton. (*d.*) Vertebrates, or such as have a jointed internal skeleton, and a great nervous cord, the spinal marrow, enclosed in a bony sheath.

182. The musk-deer lives in Thibet, and other parts of high Asia; the costly musk is formed in a gland about as large as a pigeon's egg.

183. The Cashmere goat belongs to Thibet and the western Himalayas; from its fine wool or hair the natives manufacture costly shawls, which are exported to Europe and America.

184. The elephant lives in India, Ceylon, and the Eastern Archipelago; moist and shady forests are its favorite abode.

185. Ethnology is that science which treats of the division of man into races, with their origin, relations, and characteristics.

186. The population of the globe is supposed to be about 1,200,000,000.

187. There are five races, viz.: the Caucasian, Mongolian, Ethiopian, Malay, and American race.

188. The Germanic nations are descendants of the numerous tribes of the ancient German stock that destroyed the Roman empire and erected different states upon its ruins.

189. The Romanic nations occupy southern Europe, and are so called because their languages are mostly derived from the Latin spoken by the ancient Romans. They are mixed nations, descended partly from the ancient Pelasgians and partly from other branches of Aryan stock.

190. The Italians have derived their origin from the Romans, German Longobards, and Normans, with a slight intermixture of the Arabic stock.

191. The Spanish and Portuguese have sprung from a mixture of Celts, Romans, Germans, and Arabs.

192. The number of languages spoken on the earth is estimated at 860, embracing about 5,000 dialects.

193. The language spoken by the greatest number is the Chinese; the one most widely spread is the English.

194. There are four in number: the Christian, Jewish, Mohammedan, and Pagan.

195. The Christian faith recognizes one God, and the Bible as His revealed word.

196. The Jewish faith recognizes one God, and the Old Testament as His inspired word, but rejects the New Testament.

197. The Mohammedan faith recognizes one God, and Mahomet as his last and greatest prophet, who substituted for the Bible a book called the Koran.

198. The Pagans do not recognize the God of the Bible,

but substitute other deities; many of them are idolaters, worshipping images, birds, beasts, etc.

199. Many minerals occur near the surface of the earth, in alluvial soil or the sandy beds of rivers; but the greater part lie deep in the ground, and are obtained with more or less labor by mining.

200. The most important metals are gold, silver, platinum, mercury, iron, lead, copper, tin, nickel, zinc, and antimony.

201. The value of the gold at present in the hands of the great commercial nations has been estimated as over $6,000,000,000.

202. The value of the silver at present in circulation throughout the civilized world is estimated at $13,000,000,000, or more than twice that of gold.

203. The richest silver mines in the world are those of Mexico, which yield about 1,750,000 pounds annually.

204. Iron is found in the greatest abundance in different parts of the United States and Europe. In the former, the states most noted for its production are Pennsylvania, New York, Missouri, Ohio, New Jersey, Massachusetts, Kentucky, Maryland, and West Virginia.

205. The great lead mines of the United States lie on each side of the Mississippi River, in northwestern Illinois, southwestern Wisconsin, and Iowa, and in Missouri, south of the Missouri River.

206. The richest and purest copper mines in the world lie on the shores of Lake Superior, in northern Michigan, where blocks of native copper weighing 80 tons have been found.

207. Among the principal products derived from the animal kingdom, are pork, butter, cheese, and wool.

208. In mineral resources this country surpasses all others.

209. The United States are not rich in precious stones; the largest diamond ever found in the United States was picked up by a workman on the bank of the James River, opposite Richmond. It weighed nearly 24 carats.

210. The principal supply is obtained from northwestern

Pennsylvania, in the valley of the Alleghany River and some of its tributaries, particularly Oil Creek.

211. Over 15,000,000 tons of coal were produced in 1860.

212. The entire production of lead is about 12,000 tons a year.

213. The yield of copper in 1869 was not far from 14,000 tons.

214. Zinc occurs in the Appalachian region, particularly New Jersey and Pennsylvania; also in Illinois, Missouri, Wisconsin, and Tennessee.

215. The total annual production of zinc is about 5,500 tons.

216. The sandstone quarries in the Connecticut Valley and New Jersey are especially valuable.

217. The first petroleum well was sunk in 1859, in Pennsylvania, and yielded 400 gallons a day.

218. The Mohawk Valley, in New York, is the principal source of supply, yielding more than half the entire product.

219. In 1860 over 12,000,000 bushels of salt were produced in the United States.

READING.

QUESTIONS.

1. What is reading?
2. What is elocution?
3. What is pronunciation?
4. What is correct articulation?
5. What is accentuation?
6. What is accent?
7. How many kinds of accents are there?
8. What is the primary accent? Secondary accent?
9. Define articulation.
10. What is emphasis?
11. How are emphatic words distinguished?
12. How is emphasis divided?
13. What is antithetic emphasis?
14. What is absolute emphasis?
15. What is cumulative emphasis?
16. What is inflection?
17. How many inflections are there?
18. What is the rising inflection? Falling inflection?
19. What is the monotone?
20. What is a series?
21. When two syllables of a word are accented, which has the greater force?
22. What is syllabication?

23. What is pitch, and how divided?
24. What is very low pitch?
25. What is low pitch?
26. Describe medium pitch.
27. What is very high pitch?
28. Describe high pitch.
29. Define force. Into how many divisons is it divided?
30. What is suppressed force?
31. What is medium force?
32. Define softened force.
33. What is energetic force?
34. What is very energetic force?
35. What are pauses?
36. What are grammatical pauses?
37. What are rhetorical pauses?
38. Define rate.
39. How may rate be divided?
40. Define very slow rate.
41. What is slow rate?
42. What is medium rate?
43. What is rapid rate?
44. Define very rapid rate.
45. What is slur?
46. What is quality, and how divided?
47. What is the pure tone?
48. Describe the orotund.
49. Define the aspirated voice.
50. Define the guttural voice.
51. What is the trembling tone?
52. What are some of the indispensable qualities of good reading?
53. What is the difference between the arrangement of prose and poetry?
54. What determines the proper accent of words?
55. How is inflection sometimes affected by emphasis?
56. Define the difference between enunciation and pronunciation.

READING.

ANSWERS.

1. Reading is the mode of utterance or pronunciation of written language.

2. Elocution is the art of delivering written or extemporaneous composition with force, propriety, and ease.

3. Pronunciation is the utterance of words. It embraces articulation and accentuation.

4. It consists in an accurate and distinct utterance of the elementary sounds, either singly or in combination.

5. Accentuation is the act of applying accents in reading and speaking.

6. Accent is that stress of voice applied to a certain syllable, which distinguishes it from other syllables of the same word.

7. There are two—primary and secondary accent.

8. Primary accent is the greater stress of voice. Secondary accent is the less stress of voice.

9. Articulation is the art of uttering distinctly and justly the letters and syllables constituting a word.

RULES FOR PRONUNCIATION.

Rule I. *O* and *u*, ending unaccented syllables, have their first sounds, though somewhat shortened. This rule is

frequently violated by omitting the sound of *o* or *u;* as *mem'-ry* for *mem'-o-ry; hist'-ry* for *his'-to-ry; sing'-lar* for *sin'-gu-lar; cal'-clate* for *cal'-cu-late.*

Rule II. *E*, *i*, and *y*, ending an unaccented syllable, have the first sound of *e* shortened; as, *du'-ty*, pronounced *du'-te; la'-bi-al*, pronounced *la'-be-al; mock'-e-ry*, pronounced *mock'-e-re.*

Rule III. Do not pervert, nor omit without *good* authority, the sound of any letter or syllable of a word; as, *git* for *get; crit'-er* for *creat'-ure; liv'-in* for *liv'-ing; hun'-durd* for *hun'-dred.*

10. Emphasis is that stress of voice applied to a certain word, which distinguishes it from other words in the same sentence.

11. Emphatic words are sometimes indicated by *italics*, SMALL CAPITALS, and CAPITALS; though it is generally left to the reader to determine where emphasis should be placed.

12. Emphasis is divided into antithetic, absolute, and cumulative.

13. Antithetic emphasis is that emphasis which is applied to the contrasted words of an antithesis.

14. Absolute emphasis is that emphasis which is applied to words that are in themselves important, or that do not derive their claims to vocal prominence from antithesis expressed or implied.

15. Cumulative emphasis is that emphasis which is applied with gradually increasing force to a succession of emphatic words, the last receiving the greatest.

16. Inflection is a bend or slide of the voice upward or downward.

17. There are two inflections—the rising inflection and the falling inflection.

18. The rising inflection is a bend or slide of the voice upward. The falling inflection is a bend or slide of the voice downward.

19. Monotone is the sameness of sound which prevails

when a succession of syllables or words is uttered on the same pitch.

20. A series is a number of words or phrases following one another in the same sentence.

21. The primary one.

22. Syllabication is the division of words into syllables.

23. Pitch is that tone which prevails in speaking or reading any sentence, paragraph, or discourse. Pitch is divided into five parts, which are as follows: Very low pitch, low pitch, medium pitch, high pitch, and very high pitch.

24. Very low pitch is the lowest key on which pure tones can be produced; and is the appropriate pitch for language expressive of deep solemnity and awe.

25. Low pitch is about half-way between the very low and the medium pitch; and is used for expressing solemn and sublime thoughts.

26. Medium pitch is that used in ordinary conversation; and is a suitable pitch for calm reasoning, and description, and simple narration.

27. Very high pitch is the highest key used in speaking and reading; and is the pitch which is employed in calling, in giving commands, and in expressing strong emotions.

28. High pitch is about half-way between medium and very high pitch; and may be correctly used in spirited declamation, and in expressing lively and joyous emotions.

29. Force is that stress of voice applied to phrases and sentences which distinguishes them from other phrases and sentences in the same paragraph or discourse. There are five divisions.

30. Suppressed force is the lowest degree of stress or loudness; and is used to express caution, secrecy and fear.

31. Medium force is that force which is used in common conversation, and in reading narrative and descriptive pieces, which are not particularly animated.

32. Softened force is the ordinary loudness of the voice somewhat subdued; and is appropriately employed in language of solemnity and tenderness.

33. Energetic force is the medium loudness of the voice considerably increased; and is the appropriate force for earnest declamation, and for language expressive of lively and joyous emotions.

34. Very energetic force is the greatest power or loudness of the voice; and is used in calling, and in giving commands.

35. Pauses are suspensions of the voice in reading or speaking.

36. Grammatical pauses are those that are indicated by the punctuation marks.

37. Rhetorical pauses are suspensions of the voice which the sense requires when a grammatical pause is not admissible.

38. Rate has reference to the rapidity or slowness of utterance.

39. Rate may be divided into very slow rate, slow rate, medium rate, rapid rate, and very rapid rate.

40. Very slow rate is appropriately used in expressing awe, deep solemnity, and profound reverence.

41. Slow rate is the proper movement for language expressive of gravity, dignity, grief, and sublimity.

42. Medium rate is that rate which is employed in unimpassioned narration and description.

43. Rapid rate is appropriate in earnest declamation and eager argument, and in the expression of gay, sprightly, and joyful emotions.

44. Very rapid rate is that rate which is employed in uttering language expressive of rage, haste, sudden fear, and tumult.

45. Slur is that smooth, gliding, subdued movement of the voice used in parenthetic clauses, words contrasted or repeated, and in explanation.

46. Quality has reference to the kinds of sound uttered; and is divided into the pure tone, orotund, aspirate, guttural, and trembling.

47. The pure tone is distinguished for its clearness and

smoothness; and is appropriately used in ordinary declamation and calm reasoning, and in uttering language denoting joy, cheerfulness, sorrow, and other gentle emotions.

48. The orotund is smooth, clear, full, round, deep, strong, and musical; and may be effectively employed in earnest declamation, and in expressing sentiments of solemnity, dignity, sublimity, grandeur, and reverence.

49. The aspirated voice consists of forcibly-emitted breath, united with a slight portion of pure tone, and is used to express horror, terror, wonder, fear, and rage.

50. The guttural voice is formed in the throat, and consists of a harsh sound united with aspiration. It is used to express reproach, malice, hatred, scorn, contempt, and loathing.

51. The trembling tone is an invariable waver of the voice, used to express an intense degree of suppressed excitement, or to represent the tones of enfeebled old age.

52. To read slowly, mind the pauses, give the proper inflections, speak plainly, and read as if talking.

53. Prose pays no attention to the melodious arrangement of its words, while poetry is written with regard to the rhythm and feet of each line.

54. The proper accent is determined by general usage.

55. It sometimes changes the falling to the rising inflection.

56. Enunciation is the utterance of words; and pronunciation the mode of utterance.

PHYSIOLOGY.

QUESTIONS.

1. What is Physiology?
2. What is Anatomy? Hygiene?
3. How many bones are there in the human body?
4. What three uses have the bones?
5. Why are not the bones of children as easily broken as those of aged persons?
6. Is a bone once removed ever restored?
7. What are the three general divisions of the bones?
8. How are the bones tied together?
9. What is the object of the skull?
10. Describe the spine.
11. Why is a man shorter at night than in the morning?
12. Describe the ribs.
13. Name the bones of the shoulder.
14. Name the bones of the arm.
15. Name the bones of the hand.
16. In what lies the perfection of the hand?
17. Name the bones of the leg.
18. Name the bones of the foot.
19. What are the rickets?

20. What is a felon?
21. What is the cause of bow legs?
22. What is a dislocation?
23. What are the muscles?
24. How many muscles are there?
25. What is the cause of squinting?
26. Name and define the two kinds of muscles.
27. How can you tie a knot in a bone?
28. Describe the three classes of levers.
29. Why are we shorter when walking than when standing still?
30. Why does a person when lost often go in a circle?
31. What is the effect of exercise upon the muscles?
32. Mention one law of health.
33. Ought a scholar to study during the time of recess?
34. What is the St. Vitus's Dance?
35. What is the locked jaw?
36. What are the uses of the skin?
37. What is the cuticle? The cutis?
38. Describe the hair.
39. Does the hair grow after death?
40. Is there any feeling in a hair?
41. How can the hair stand on end?
42. Of what use is fat to the body?
43. What is noticeable of the fat?
44. Name and describe the four kinds of teeth.
45. Describe the milk teeth.
46. Describe the permanent teeth.
47. Describe the structure of the teeth.
48. What are the oil glands?
49. What are the perspiratory glands?
50. Name the three uses of the skin.
51. What colored clothing is best adapted for all seasons?
52. Why are two light woolen garments warmer than one heavy one?
53. How is the system made more vigorous?
54. Name the organs of respiration and the voice.

55. What is the larynx? The œsophagus?
56. What is the cause of the voice "changing?"
57. Could a person talk without his tongue?
58. How are talking machines made?
59. Does whistling depend upon the voice?
60. Describe the wind-pipe.
61. What two acts constitute respiration?
62. How often do we breathe?
63. What is sighing? Coughing?
64. How can a good shot with a rifle be made?
65. What is sneezing? Snoring?
66. What are the constituents of the air?
67. What is laughing? Crying?
68. What is yawning? Hiccough?
69. For what is the "Black Hole of Calcutta" noted?
70. When is the perfection of ventilation reached?
71. Is the night air out-of-doors injurious?
72. How should we ventilate our bed-rooms and school-houses?
73. How many acts of breathing do we perform yearly?
74. What is the bronchitis? Pleurisy?
75. Is a fashionable waist a model of art in sculpture or painting?
76. Should a fire-place be closed?
77. What is pneumonia? Consumption?
78. How may a constitutional tendency to consumption be warded off in youth?
79. Name the organs of the circulation.
80. Does the blood permeate all parts of the body?
81. What is the average amount of blood in each person?
82. Is the blood of our bodies red?
83. Where is the blood purified?
84. Describe the heart.
85. What are the auricles?
86. What are the ventricles?
87. What are the arteries?

88. Give a general description of the arterial system.

89. What is the average number of pulsations per minute?

90. What are the veins?

91. What are the capillaries?

92. Of how many parts does the circulation consist?

93. Describe the lesser circulation.

94. Describe the greater circulation.

95. What is the velocity of the blood?

96. What is the average temperature of the body?

97. How much does this vary in health?

98. Will the removal of the brain produce death?

99. Should we use wall-paper having much green?

100. How can you tell whether the blood comes from an artery or a vein?

101. Why is a cold dangerous?

102. What is the rule for prevention and cure of a cold?

103. How much food is needed per day by an adult in active exercise.

104. Do we destroy the force that we use?

105. What three kinds of food do we need?

106. What is nitrogenous food?

107. What is carbonaceous food?

108. Name the mineral matters which should be contained in our food.

109. Could a person live on one kind of food alone?

110. Describe the general plan of digestion.

111. Describe the saliva.

112. Describe the process of swallowing.

113. Describe the stomach.

114. What is the gastric juice?

115. What is chyme?

116. What is the bile?

117. What is the pancreatic juice?

118. What is the construction of the liver?

119. What is the length of time required for digesting a full meal?

120. Are warm biscuit and bread healthy?

121. Is tobacco detrimental to youth?

122. Give some of the reasons why a young man should not learn to use tobacco.

123. Why is frying an unhealthy mode of cooking food?

124. State the five evil results of rapid eating.

125. If one is compelled to eat a meal rapidly, as at a railroad station, what should he take?

126. State the relation of waste to repair in youth, in middle and in old age.

127. Must a student starve himself?

128. Why should care be banished from the table?

129. Will a regular routine of food be beneficial?

130. What are the principal causes of dyspepsia?

131. What is the best remedy for a bilious man?

132. What are the organs of a nervous system?

133. Describe the brain.

134. Of how many parts does the brain consist?

135. Describe the cerebrum.

136. What is the effect of removing the cerebrum?

137. Describe the cerebellum.

138. What is the effect of removing the cerebellum?

139. Describe the spinal cord.

140. What is the medulla oblongata?

141. Describe the nerves.

142. What are the motory nerves?

143. What are the sensory nerves?

144. When will motion be lost and feeling remain?

145. When will feeling be lost and motion remain?

146. Name the three classes of nerves.

147. How many and what are the spinal nerves?

148. What are the cranial nerves?

149. Describe the sympathetic system.

150. What is reflex action?

151. What three stages are there in the effect of alcohol on the nervous system?

152. Describe the stage of excitement.

153. Describe the stage of muscular weakness.
154. Describe the stage of mental weakness.
155. Does alcohol confer any permanent strength?
156. What is the influence of sunlight on the body?
157. Name some of the wonders of the brain.
158. Describe the sense of feeling.
159. Describe the sense of taste.
160. Describe the organ of smell.
161. Must the object to be smelled touch the nose?
162. What are the uses of this sense?
163. How is the ear divided?
164. Describe the external ear.
165. Describe the middle ear.
166. Describe the internal ear.
167. How do we hear?
168. Describe the eye.
169. Is the eye a perfect sphere?
170. How do we see?
171. What care should be taken with regard to the direction of the light when we are at work?
172. What is the first step to be taken in the cure of a disease?

PHYSIOLOGY.

ANSWERS.

1. Physiology is that department of natural science which treats of the organs and their functions, in animals and plants.

2. Anatomy is the art of dissecting, or artificially separating the different parts of any organized body, to discover their situation, structure, and economy. Hygiene is that department of medical science which treats of the preservation of health.

3. There are two hundred, omitting the bones of the ear.

4. (*a.*) To protect the delicate organs. (*b.*) To serve as levers on which the muscles may act to produce motion. (*c.*) To preserve the shape of the body.

5. Because their bones are composed of cartilage, and by their elasticity assist in breaking the shock of a fall.

6. Yes; instances are on record where the bone had been removed, leaving the periosteum, from which the entire bone was afterward renewed.

7. They are considered in three divisions—the head, the trunk, and the limbs.

8. The bones which form the joint are tied with stout ligaments or bands of a smooth, silvery, white tissue, so strong that the bones are sometimes broken without injuring the fastenings.

9. The skull forms a cavity for the protection of the brain, and four organs of sense, viz.: Sight, smell, taste, and hearing.

10. The spine consists of twenty-four bones, between which are placed pads of cartilage. A canal is hollowed out of the column for the safe passage of the spinal cord. The packing acts as a cushion to prevent any jar from reaching the brain when we jump or run, while the double curve of the spine also tends to disperse the force of a fall.

11. It is because the pads of the spine become condensed by the weight they bear during the day, but their elasticity causes them to resume their usual size during the night, or when we lie down for a time.

12. The ribs are also twenty-four in number, and are arranged in pairs on each side of the chest. At the back they are all attached to the spine. In front, the upper seven pairs are tied by cartilages to the breast-bone; three are fastened to each other and the cartilage above; and two, the floating ribs, are loose.

13. The bones of the shoulder are the collar-bone (*clavicle*), and the shoulder-blade (*scapula*).

14. The bones of the arm are the *humerus*, *ulna*, and *radius*.

15. There are eight wrist or *carpal* bones, five *metacarpal* bones, and fourteen *phalanges*.

16. The hand in its perfection belongs only to man. Its elegance of outline, delicacy of mould, and beauty of color, have made it the study of artists; while its exquisite mobility, and adaptation as a perfect instrument, have led many philosophers to attribute man's superiority even more to the hand than to the mind.

17. The bones of the leg are the *femur*, *patella*, *tibia*, and *fibula*.

18. The bones of the foot are seven *tarsal* bones, five *metatarsal* bones, and fourteen *phalanges*.

19. The rickets are caused by a lack of mineral matter in the bones, rendering them soft and pliable, so that they bend under the weight of the body. They thus become permanently distorted, and, of course, are weaker than if they were straight.

20. A felon is a swelling of the finger or thumb, generally of the last joint. It is caused by the accumulation of matter beneath the periosteum and next to the bone. Necessarily it should be opened, so as to prevent the poison collected there from being absorbed and again scattered through the system.

21. Bow legs are caused by children standing on their feet before the bones of the lower limbs are strong enough to bear their weight.

22. A dislocation is produced by the rupture of the tissues of the joint, so that the head of the bone is driven out of its socket and into some other place, both by the force of the blow which caused the injury, and by the contraction of the muscles.

23. The muscles are fleshy organs of motion, which give form and symmetry to the body.

24. They are in all about five hundred, each having its special use, and all working in exquisite harmony and perfection.

25. Most cases of squinting are caused by long-sightedness, the muscles being strained in the effort to obtain distinct vision.

26. There are two kinds of muscles—the voluntary, which are under the control of our will, and the involuntary, which are not.

27. By soaking it in weak muriatic acid, and thus dissolving the mineral matter.

28. An illustration of the first class of levers may be seen in the movements of the head; of the second class,

when we raise the body on tiptoe; and of the third class, in lifting the hand from the elbow.

29. It is because we are successively falling forward to take a step in advance.

30. As we step alternately with the feet, we are inclined to turn the body first to one side, and then to the other. This movement is sometimes counterbalanced by swinging the hand on the opposite side, and in this case one side of the body tends to outwalk the other.

31. By use they become larger, harder, and more compact; by disuse they decrease in size, and become soft, flabby, and pale.

32. A sedentary life needs daily, moderate exercise, which always stops short of fatigue.

33. No; recesses should be as strictly devoted to play as study hours are to work.

34. The St. Vitus's Dance is a disease of the voluntary muscles, whereby they are in frequent, irregular, and spasmodic motion, beyond the control of the will.

35. The locked jaw is a disease in which there are spasms and a contraction of the muscles, usually beginning in the lower jaw. It is serious—often fatal—yet it is sometimes caused by as trivial an injury as the stroke of a whip-lash, the lodgment of a bone in the throat, a fish-hook in the finger, or the puncture of the sole of the foot by a tack or nail.

36. The skin is a tough, thin, close-fitting garment for the protection of the tender flesh. Its perfect elasticity beautifully adapts it to every motion of the body. It oils itself to preserve its smoothness and delicacy, replaces itself as fast as it wears out, and is at once the perfection of use and beauty.

37. The cuticle is the outer skin. The cutis is the true skin. The latter is full of nerves and blood-vessels, while the former neither bleeds nor gives rise to pain; neither suffers with heat nor feels the cold.

38. The hair is a protection from heat and cold, and

shields the head from blows. It is found on nearly all parts of the body, except the palms of the hands and the soles of the feet.

39. Yes; and it is due to the fact that by the shrinking of the skin the part below the surface is caused to project, which is especially noticeable in the beard.

40. The hairs themselves are destitute of feeling, but nerves, however, are found in the hollows in which the hair is rooted, and so one feels pain when it is pulled.

41. Wherever hair exists tiny muscles are found, interlaced among the fibres of the skin. These, when contracting under the influence of cold or electricity, pucker up the skin, and cause the hair to stand on end.

42. Fat gives roundness and plumpness to the body, and acts as a powerful non-conductor for the retention of the heat. It collects as pads in the hollows of the bones, around the joints, and between the muscles, causing them to glide more easily upon each other.

43. It is noticeable that the fat does not gather within the cranium, the lungs, or the eye-lids, where its accumulation would clog the organs.

44. The teeth are thirty-two in all—there being eight in each half jaw, similarly shaped and arranged. In each set of eight, the two nearest the middle of the jaw have wide, sharp, chisel-like edges, fit for cutting, and hence are called *incisors*. The next corresponds to the great tearing or holding tooth of the dog, and is styled the *canine*, or eye-tooth. The next two have broader crowns, with two points or cusps, and hence are termed *bicuspids*. The remaining three are much broader, and as they are used to crush the food, are called *grinders* or *molars*.

45. We are provided with two sets of teeth. The first, or milk teeth, are small, and only twenty in number. In each set of five there are two incisors, one canine, and two molars. The middle incisors are usually cut about the age of seven months, the others at nine months, the first molars

at twelve months, the canines at eighteen months, and the remaining molars at two or three years of age.

46. At six years, when the first set are usually still perfect, the jaws contain the crowns of all the second, except the wisdom teeth. About this age, to meet the wants of the growing body, the crowns of the permanent set begin to press against the roots of the milk teeth, which, becoming absorbed, leave the loosened teeth to drop out, while the new ones rise and occupy their places. The central incisors appear at about seven years of age, the others at eight; the first bicuspids at nine, the second at ten; the canines at eleven or twelve; the second molars at twelve or thirteen; and the last, or wisdom-teeth, are delayed sometimes until the twenty-second year, or even later.

47. The interior of the tooth consists principally of *dentine*, a dense substance resembling bone. The crown of the tooth, which is exposed to wear, is protected by a sheath of enamel. This is a hard, glistening, white substance, containing only two and a half per cent of animal matter. The fang is covered by a thin layer of true bone (cement). At the center of the tooth is a cavity filled with a soft, reddish-white, pulpy substance, full of blood-vessels and nerves. This pulp is very sensitive, and toothache is caused by its irritation.

48. The oil glands are clusters of tiny sacs which secrete an oil that flows along the duct to the root of the hair, and thence oozes out on the cuticle.

49. The perspiratory glands are fine tubes about $\frac{1}{300}$ of an inch in diameter, and a quarter of an inch in length, which run through the cutis, and then coil up in little balls. They are found in all parts of the body, and in almost incredible numbers.

50. (*a*) Its *protective* power; (*b*) its *exhaling* power; (*c*) its *absorbing* power.

51. Light colored clothing; as it is not only cooler in summer, but warmer in winter.

52. It is because between them there is a layer of non-conducting air.

53. The system is made more vigorous by exercise, and plenty of wholesome food.

54. The organs of respiration and the voice are the larynx, the trachea, and the lungs.

55. The larynx is a small muscular box, placed just behind the tongue, and at the top of the windpipe. The œsophagus is a tube which leads to the stomach.

56. When boys are at the age of fourteen years, the larynx grows larger, and the cords proportionately longer and coarser; consequently, the voice becomes deeper, or, as we sometimes say, "changes."

57. Yes; for when the tongue is removed the adjacent organs in some way largely supply the deficiency, so that speech is still possible.

58. Talking machines are made by constructing an artificial larynx, which may be made by using elastic bands to represent the vocal cords, and by placing above them chambers which by their resonance will produce the same effect as the cavities lying above the larynx.

59. It does not. Whistling is a pure mouth sound.

60. The windpipe, or trachea, is so called because of its roughness. It is strengthened by C-shaped cartilages with the openings behind, where they are attached to the œsophagus. At the lower end the trachea divides into two branches, called the right and left *bronchi*. These subdivide into the small bronchial tubes, which ramify through the lungs like the branches of a tree, the tiny twigs of which at last end in clusters of cells so small that there are 600,000,000 in all.

61. Respiration consists of two acts—taking in the air, or inspiration, and expelling the air, or expiration.

62. Ordinary, quiet breathing is performed mainly by the diaphraghm—one breath to every four beats of the heart, or eighteen per minute.

63. Sighing is merely a prolonged inspiration, followed

by an audible expiration. Coughing is a violent expiration, in which the air is driven through the mouth.

64. We should take aim with a full chest and tight breath, since then the arms will have a steadier support.

65. Sneezing differs from coughing, the air being forced through the nose. Snoring is a sleeping accompaniment, in which the air passes through both nose and mouth. The peculiar sound is produced by the palate flapping in this divided current of air, and so throwing it into vibration.

66. The atmosphere consists of one fifth oxygen and four-fifths nitrogen. The former is the active element, and the latter the passive. Oxygen alone would be too stimulating, and must be restrained by the neutral nitrogen.

67. Laughing and crying are very much alike. The expression of the face is necessary to distinguish between them. The sounds are produced by short, rapid contractions of the diaphragm.

68. Yawning, or gaping, is like sighing. It is distinguished by a wide opening of the mouth, and a deep, profound inspiration. Hiccough is confined to inspiration. It is caused by a contraction of the diaphragm, and a constriction of the glottis.

69. During the English war in India, in the last century, 146 prisoners were shut up in a room scarcely large enough to hold them, into which the air could only enter by two narrow windows. At the end of eight hours but 23 remained alive, and these were in a most deplorable condition.

70. The perfection of ventilation is reached when the air of a room is as pure as that out-of-doors. To accomplish this result it is necessary to allow for each person 800 cubic feet of space, while ventilation is going on in the best manner known.

71. It is, in times and places of malaria, and should be carefully avoided, even at the risk of bad air in-doors.

72. Open the windows a little at the top and bottom. Put on plenty of clothing to keep warm, by day and by

night, and then let the inspiring oxygen come in as freely as God has given it.

73. We yearly perform at least 7,000,000 acts of breathing, inhaling 100,000 cubic feet of air, and purifying over 3,500 tons of blood.

74. Bronchitis is an inflammation of the mucous membrane of the bronchial tubes. It is accompanied by an increased secretion of mucus, and consequent coughing. Pleurisy is an inflammation of the pleura. It is sometimes caused by an injury to the ribs, and results in a secretion of water within this membrane.

75. It is not.

76. It should not. Thousands of lives would be saved if all fire-places were kept open. If you are so fortunate as to have a fire-place in your room, paint it when not in use; put a bouquet of fresh flowers in it every morning, if you please, or do anything to make it attractive, but never *close it.*

77. Pneumonia is an inflammation of the lungs, affecting chiefly the air-cells. Consumption is a disease which destroys the substance of the lungs. Like other lung difficulties, it is caused largely by want of pure air, a liberal supply of which is the best treatment that can be prescribed for it.

78. Besides plenty of fresh air and exercise, care should be taken in the diet. Rich pastry, unripe fruit, salted meat, and acid drinks should be avoided, and a certain quantity of fat should be eaten at each meal.

79. The organs of circulation are the heart, the arteries, the veins, and the capillaries.

80. The blood permeates every part of the body, except the cuticle, nails, hair, etc.

81. The average quantity of blood in each person is about eighteen pounds.

82. No; it is no more red than the waters of a stream would be if you were to fill it with little red fishes.

83. The blood is purified in the lungs.

84. The heart is the engine which propels the blood. It is a hollow, pear-shaped muscle, about the size of the fist. It hangs, point downward, just to the left of the center of the chest, and is enclosed in a loose sack of serous membrane, called the pericardium. This secretes a lubricating fluid, and is smooth as satin.

85. The auricles are merely reservoirs to receive the blood—the left auricle, as it filters in bright and pure from the lungs; the right, as it returns dark and foul from the tour of the body—and to furnish it to the ventricles as they need.

86. The ventricles force the blood—the left, to all parts of the body; the right, to the lungs—and are, therefore, made very strong. As the left ventricle drives the blood so much farther than the right, it is correspondingly thicker and stronger.

87. The arteries are tube-like canals which convey the blood from the heart to nourish the system. They carry only the red blood, and are composed of an elastic tissue, which yields at every throb of the heart, and, then slowly contracting again, keeps up the motion of the blood until the next systole.

88. The arterial system starts from the left ventricle by a single trunk—the *aorta*—which, after giving off branches to the head, sweeps back of the chest with a bold curve—the *arch of the aorta*—and thence runs downward, dividing and sub-dividing, like a tree, into numberless branches, which, at last, penetrate every nook and corner of the body.

89. In health, there are about seventy-two pulsations per minute. They increase with excitement or inflammation, weaken with loss of vigor, and are modified by nearly every disease.

90. The veins are the channels by which the blood returns to the heart. They, therefore, carry the dark or venous blood. And as they do not receive the direct impulse of the heart, their walls are made much thinner and less elastic than those of the arteries.

91. The capillaries form a fine net-work of tubes, connecting the ends of the arteries with the veins.

92. The circulation consists of two parts, the lesser and the greater.

93. The dark blood from the veins collects in the right auricle, and, going through the tricuspid valve, empties into the right ventricle. Thence it is driven past the semi-lunar valves, through the pulmonary artery, to the lungs. After circulating through the fine capillaries of the air-cells, it is returned bright and red, through the pulmonary veins, to the left auricle.

94. From the left auricle, the blood is forced past the bicuspid valve to the left ventricle; thence it is driven through the semi-lunar valves into the great aorta, the main trunk of the arterial system. Passing through the arteries, capillaries, and veins, it returns through the *venæ cavæ*, ascending and descending, gathers again in the right auricle, and so completes the "grand round" of the body.

95. The velocity of the blood varies in different parts of the body, and cannot be calculated with any degree of accuracy. It has been estimated that a portion of the blood will make the tour of the body in about twenty-three seconds, and that the entire mass passes through the heart in from one to two minutes.

96. The average temperature of the body is not far from 98°.

97. Not more than 2°, even in the greatest extremes of temperature.

98. If respiration and circulation be kept up artificially, the removal of the brain will not produce death.

99. No; persons have thus been poisoned by tiny particles of arsenic, which evaporate from green wall-paper, and float in the air.

100. If from an artery, it will be of red blood, and will come in jets; if from the veins, it will be of dark blood, and will flow in a steady stream.

101. Because it weakens the system and paves the way for other diseases.

102. The rule for prevention and cure of a cold is to *keep the blood upon the surface.*

103. To replace the daily outgo we need about two and a quarter pounds of food, and three pounds of drink.

104. No matter has been destroyed, so far as we know, since the creation, and force is equally indestructible.

105. Nitrogenous, carbonaceous, and mineral food.

106. It is that which contains much nitrogen. The most common forms are whites of eggs; caseine, the chief constituent of cheese; lean meat; and gluton.

107. It is food containing much carbon, and consists of two kinds, viz.: the *sugars* and the *fats.*

108. Food should contain water and certain common minerals, such as iron, sulphur, magnesia, phosphorous, salt, and potash.

109. No; one kind of food is insufficient. A person fed on starch alone, having nothing with which to make muscle, would die. It would be a clear case of nitrogen starvation.

110. (*a*) The food is chewed, mixed with the saliva in the mouth, and swallowed; (*b*) it is acted upon by the gastric juice in the stomach; (*c*) passed into the intestines, where it receives the bile, pancreatic juice, and other liquids, which completely dissolve it; (*d*) the nourishing part is absorbed in the stomach and intestines, and thence thrown into the blood-vessels, whence it is whirled through the body by the torrent of the circulation.

111. The saliva is a thin, colorless, frothy, slightly alkaline liquid, secreted by the mucous membrane lining the mouth, and by three pairs of salivary glands in the neck. The amount varies, but on the average is about three pounds per day, and in health is always sufficient to keep the mouth moist. It softens and dissolves the food, and thus enables us to get the flavor or taste of what we eat.

112. The food thus finely pulverized, softened, and so lubricated by the viscid saliva as to prevent all friction as it passes over the delicate membranes, is conveyed by the tongue and cheek to the back of the mouth. The soft palate is lifted so as to close the nasal opening; the epiglottis shuts down, and along this bridge the food is borne, without danger of falling into the windpipe or escaping into the nose. The muscular bands of the throat now seize it and take it beyond our control. The fibres of the œsophagus contract above, while they are lax below, and convey the food by a worm-like motion into the stomach.

113. The stomach is an irregular expansion of the digestive tube. Its shape has been compared to that of a bagpipe. It holds about three pints, though it is susceptible of some distension. It is composed of an inner mucous membrane, which secretes the digestive fluids; an outer, smooth, well lubricated serous one, which prevents friction, and between them a stout, muscular coat. The last consists of two layers of longitudinal and circular fibres. When these contract, they produce a peculiar churning motion, called the *peristaltic* movement, which thoroughly mixes the contents of the stomach.

114. The gastric juice is a thin, colorless fluid, and is secreted to the amount of twelve pounds per day. Its acidity is probably due to muriatic or lactic acid—the acid of sour milk.

115. Chyme is the food, reduced by the action of the gastric juice to a grayish, soupy mass.

116. The bile is secreted by the liver. This gland weighs about four pounds, and is the largest in the body; and is located on the right side, below the diaphragm. The bile is of a dark golden color, and bitter taste. Nearly three pounds are secreted per day; and when not needed for digestion, it is stored in the gall cyst. Its action on the food is necessary to life, although not fully understood.

117. The pancreatic juice is a secretion of the pancreas, or "sweet bread"—a gland nearly as large as the hand, lying

behind the stomach. It is slightly alkaline, and has an organic principle—*pancreatin*—which has the power of changing starch to sugar. Its principal work, however, is in breaking up the globules of fat into myriads of minute particles, which mix freely with water, and remain suspended in it like butter in new milk.

118. The liver consists of a mass of polyhedral cells only $\frac{1}{1000}$ to $\frac{1}{2000}$ of an inch in diameter, filling a mesh of capillaries. The capillaries carry the blood to and fro, and the cells secrete the bile.

119. The length of time required for digesting a full meal is from two to four hours. It varies with the kind of food, state of the system, perfection of mastication, etc.

120. They are not; as they are condensed by mastication into a pasty mass which is not easily penetrated by the gastric juice.

121. Yes; especially those of a nervous, sensitive organization. Its tendency is to retard the developement of the body.

122. It will diminish the mental force by which a young man commences the work of life; while its narcotic influence will often beguile his energy and palsy his strength at the very time when every faculty should be awake.

123. Because, by so cooking, the fat becomes partially disorganized.

124. (*a*) There is not enough saliva mixed with the food; (*b*) the coarse pieces resist the action of the digestive fluids; (*c*) the food is washed down with drinks, which dilute the gastric juice, and hinder its work; (*d*) we do not appreciate the quantity we eat until the stomach is overloaded; (*e*) failing to get the taste of our food, we think it insipid, and hence use condiments, which over-stimulate the digestive organs.

125. He would do well to confine himself principally to meat; and to dilute this concentrated food with fruit, crackers, etc., taken afterwards more leisurely.

126. In youth repair exceeds waste, and hence the body

grows rapidly, and the form is plump. In middle life, repair and waste equal each other, and growth ceases. In old age, waste exceeds repair, and hence the powers are enfeebled, and the skin lies in wrinkles on the shrunken form.

127. No; the greatest workers are the greatest eaters. A mighty engine needs a corresponding furnace—although we should be careful not to use more fuel than is needed to run the machine.

128. Because care and grief are the bitterest foes of digestion. A cheerful face and a light heart are friends to long life, and nowhere do they serve us better than at the table. It was the design of our Maker that we should enjoy eating; and that, having stopped before satiety was reached we should have the satisfaction always attendant on a good work well done.

129. No; investigations have shown that any one kind of food, however nutritious in itself, fails, after a time, to preserve the highest working power of the body. Our appetite becomes insipid when we confine our diet to a regular routine. Nature demands variety, and she has furnished the means of gratifying it.

130. Dyspepsia is generally caused by an overtaxing of the digestive organs. Too much food is used, and the entire system is burdened by the excess. Meals are taken at irregular hours, when the fluids are not ready; or a hearty supper is eaten when the body, wearied with the day's labor, certainly demands rest.

131. Diet, so as to give the organs rest, and active exercise, to arouse the secretions and the circulation.

132. The nervous system includes the brain, the spinal cord, and the nerves.

133. The brain is the seat of the mind. It is nearly the shape of an egg, and fills closely the cavity of the skull; its average weight being about fifty ounces. It reposes securely on a water-bed, being surrounded by a double membrane, delicate as a spider's web, which forms a closed sack, filled, like the spaces in the brain itself, with a liquid

resembling water. Within this, and closely investing the brain, is a fine tissue, with a mesh of blood-vessels, which drifts down into the hollows, and bathes them so copiously that it uses one fifth of the entire circulation of the body.

134. The brain consists of two parts—the *cerebrum* and the *cerebellum*.

135. The cerebrum fills the front and upper part of the skull, and comprises nearly seven-eighths of the entire weight of the brain. It is a mass of white fibres, with cells of gray matter sprinkled on the outside, or lodged here and there in *ganglia*.

136. The cerebrum is the center of intellect and meditation. Partridges, from which it is removed, are thrown in profound stupor, and are inattentive to surrounding objects; they, at times, will open their eyes with a vacant stare, and then relapse into their former insensibility.

137. The cerebellum lies below the cerebrum, and in the back part of the head. It is nearly the size of a small fist, its structure being similar to that of the brain proper; but, instead of winding together, it has parallel ridges, which, letting the gray matter down deeply into the white matter within, give it a peculiar appearance, called the *arbor-vitæ*, or tree of life.

138. This part of the brain is the center for the control of the voluntary muscles. Partridges, from which it is removed, seem excited and nervous, eagerly trying to escape, with uncertain, sprawling movements.

139. The spinal cord occupies the cavity of the backbone, being protected by the same membranes as the brain, but, unlike it, the white fibres are on the outside, and the gray cells within. Deep fissures separate it into halves, which are joined by a bridge of the same substance.

140. The medulla oblongata is an expansion of the spinal cord, as it leaves the brain.

141. The nerves are hard, glistening, silvery threads, composed, like the spinal cord, of white matter without and gray within. They ramify to all parts of the body, often

being very near each other, yet are perfectly distinct, each conveying its own impression.

142. The motory nerves are those nerves which carry the orders of the mind to the different organs.

143. The sensory nerves are those nerves which bring back impressions that they receive.

144. When the motory nerve is cut; all motion will then be destroyed, while sensation will exist as before.

145. When the sensory nerve leading to any part is cut; all sensation in that spot will be lost, while motion will remain.

146. The nerves are divided into three general classes—the spinal, the cranial, and the sympathetic.

147. There are thirty-one pairs, which issue from the spinal cord through apertures provided for them in the backbone. Each nerve arises by two roots; the posterior is the sensory, and the anterior the motory one.

148. The cranial nerves are twelve pairs in number, which spring from the lower part of the brain and the medulla oblongata.

149. The sympathetic system consists of a double chain of ganglia, on either side of the backbone, extending into the chest and abdomen. From these, delicate nerves run to the organs on which life depends—the heart, lungs, stomach, etc.—to the blood-vessels, and to the spinal and cranial nerves over the body.

150. Since the gray matter generates the nervous force, a ganglion is capable of receiving an impression, and of sending back or reflecting it so as to excite the muscles to action. This is done without the consciousness of the mind. Thus we wink involuntarily at a flash of light or a threatened blow; we start at a sudden sound; we jump back from a precipice before the mind has time to reason upon the danger.

151. (*a*) The stage of excitement; (*b*) the stage of muscular weakness; (*c*) the stage of mental weakness.

152. In the stage of excitement, the outposts of the nerves are paralyzed. The force, now drawn into the nervous centers, drives the machinery of life with tremendous energy. The heart pumps like the main-spring of a watch, when the resistance of the wheels is removed; while the blood surges through the body with increased force.

153. Should the influence still continue, the alcohol acts upon the spinal cord. The control of some of the muscles is lost. Those of the lower lip usually fail first, then the lower limbs, and the staggering, uncertain steps betray the result.

154. At this stage the cerebrum is implicated; the center of thought and will being overpowered, the mind is a chaos; the reason giving away, the animal instincts assume the mastery of the man.

155. No. It may enable a weary or feeble organism to do brisk work for a short time. It may make the brain briefly brilliant; also may excite muscle to quick action; but it does nothing at its own cost, fills up nothing it has destroyed, and itself leads to destruction.

156. The influence of the sun's rays upon the nervous system is very marked. The sun-bath is unquestionably a most efficient remedy for many diseases. We should open our window blinds, and the curtains should be thrown back, letting the blessed air and sun stream in to invigorate and cheer. No house buried in shade, and no room with darkened windows, is fit for human habitation.

157. The brain is the least solid and most unsubstantial looking organ in the body. About eighty per cent of water, seven of albumen, some fat, and a few smaller substances, constitute the instrument which governs the world. Surprisingly, the brain, which is the seat of sensation, is itself without feeling. Every nerve, every part of the spinal cord, is keenly alive to the slightest touch, yet "the brain may be severed, consumed with fire, or given an electric shock, without producing pain."

158. Touch, or the sense of feeling, is sometimes called the "common sense," since its nerves are spread over the whole body. It is most delicate in the point of the tongue and tips of the fingers. The surface of the cutis is covered with minute, conical projections called *papillæ*. Each of these contains its tiny nerve—twigs, which receive the impression and transmit it to the brain, where the perception is produced.

159. The sense of taste is located in the *papillæ* of the tongue and palate. The *papillæ* starts up when tasting, as you can see by placing a drop of vinegar on another person's tongue, or your own, before a mirror. The velvety look of this organ is given by hair-like projections of the cuticle upon some of the *papillæ*. They absorb the liquid to be tasted, and convey it to the nerves.

160. The nose, the seat of this sense, is composed of cartilage covered with muscles and skin, and joined to the skull by small bones. The nostrils open at the back into the pharynx, and are lined by a continuation of the mucous membrane of the throat. The olfactory nerves enter through a sieve-like, bony plate at the roof of the nose, and are distributed over the inner surface of the two olfactory chambers.

161. No; the object to be smelled need not touch the nose, as tiny particles borne on the air enter the nasal passages.

162. The uses of the sense of smell are to guide us in the choice of our food, and to warn us against bad air and unhealthy localities.

163. The ear is divided into the external, middle, and internal ear.

164. The external ear is a sheet of cartilage, folded in a curious manner, for catching sound. The auditory canal, or tube of this ear-trumpet, is about an inch long. Across the lower end is stretched a membrane, the *tympanum*, or drum, which is kept soft by a fluid wax.

165. The middle ear is a cavity, at the bottom of which is the Eustachian tube, leading to the mouth. Across this chamber hangs a chain of three singular little bones, named, from their shape, the hammer, the anvil, and the stirrup. These bones together weigh but a few grains, yet they are covered by a periosteum, are supplied with blood-vessels, and articulate with perfect points, having synovial membranes, cartilages, ligaments, and muscles.

166. The internal ear is hollowed out of the solid bone. In front is the vestibule or ante-chamber, about as large as a grain of wheat; from it open three semi-circular canals, and the winding stair of the *cochlea*, or snail shell. Here expand the delicate fibrils of the auditory nerve. Floating in the liquid which fills the internal ear is a little bag containing hair-like bristles, fine sand, and two ear-stones. All these knocking against the ends of the nerves serve to increase any impulse given to the liquid in which they lie.

167. Whenever one body strikes another in the air, waves are produced. These waves of air strike upon the tympanum. This vibrates, and sends the motion along the chain of bones in the middle ear to the fluids of the internal ear. Here bristles, sand and stones pound away, and the wondrous harp of the cochlea, catching up the pulsations, carries them to the fibres of the auditory nerve, which conveys them to the brain, and gives the mind the idea of sound.

168. The eye is lodged in a bony cavity, protected by the overhanging brow. It is a globe, about an inch in diameter. The ball is covered by three coats—(*a*) the *sclerotic* a tough, hard casing, which gives form to the eye, in front of which is set, like a watch crystal, the transparent cornea; (*b*) the *choroid*, a black lining to absorb the superfluous light; (*c*) the *retina*, the expansion of the optic nerve, at the back of the eye.

169. The cornea projects in front, and the optic nerve at the back sticks out like a handle, while the ball itself has its longest diameter from side to side.

170. There is believed to be a kind of universal atmosphere, termed *ether*, filling all space. This substance is more subtle than the air, and occupies its pores, as well as those of all other substances. As sound is caused by waves in the atmosphere, so light is produced by waves in the ether. A lamp-light, for example, sets in motion waves of ether, which pass in through the pupil of the eye to the retina, where the rods and cones transmit the vibration through the optic nerve to the brain, and then the mind sees the light.

171. When reading, writing, or working, the *light should be at one side, and never in front.* Consequently the position of school-room desks is of great importance.

172. The first step in the cure of any disease is to obey the law of health which has been violated. When medicine is taken it is not to destroy the disease, since that is not a thing to be destroyed, but to hold the deranged action in check while nature repairs the injury, and again brings the system into harmonious movement.

WRITING.

QUESTIONS.

1. What is writing?
2. Describe the correct manner of holding the pen.
3. How many different movements may be employed in writing?
4. Describe the finger movement.
5. Describe the fore-arm movement.
6. Describe the combined movement.
7. Describe the whole-arm movement.
8. What is a line in penmanship called?
9. How many kinds of lines are used?
10. Will you name them?
11. Will you tell how to make a straight line?
12. Will you tell how to make a curved line?
13. How many different kinds of curved lines, and what are they called?
14. Will you describe a right curve?
15. Will you describe a left curve?
16. How many different kinds of lines are there with respect to position, and what are they called?
17. When is a line said to be horizontal?

18. When is a line said to be vertical?

19. When are lines said to be oblique or slanting?

20. When are lines said to be parallel?

21. What is an angle?

22. What is a right angle?

23. Will you name the different kinds of angles?

24. What is an acute angle?

25. What is an obtuse angle?

26. By what do we measure angles?

27. How is every circle divided?

28. How many degrees are there in a quadrant, or quarter circle?

29. What angle does the vertical line form with the horizontal, as measured by the circle?

30. What angle is formed by a line drawn half way between the vertical and horizontal to the center of the circle?

31. What do you call an angle of 7 degrees greater than that of 45 degrees?

32. What do you call an angle of 22 degrees less than that of 52 degrees?

33. A line forming with the horizontal an angle of 52 degrees, may be said to be on what slant?

34. A line forming with the horizontal an angle of 30 degrees, may be said to be on what slant?

35. In what position are the written letters, vertical or slanting?

36. To which side of the vertical do the letters lean or slant?

37. What is the slant of 52 degrees in the Spencerian writing called?

38. Why is it so called?

39. What is the slant of 30 degrees called?

40. Why is it called the connective slant?

41. What is the unit for measuring the height of letters?

42. What is the unit for measuring the width of letters?

43. How are strokes combined in forming letters?

44. How is an angular joining made?

45. How is a short turn made?

46. How are oval turns made?

47. How is a loop formed?

48. Will you describe an oval?

49. How many kinds of ovals are employed in writing, and what are they called?

50. Will you describe the manner of forming the direct oval?

51. Describe the manner of forming the reversed oval.

52. What are principles in writing?

53. How many principles are there given, according to the Spencerian system?

54. Will you give descriptive names to the several principles?

55. Which principles are used in making the small letters?

56. Which principles form the prominent parts of the capitals?

SMALL LETTERS.

57. What two forms has each letter of the alphabet?

58. Into how many classes are the small letters divided, and what are they?

59. What are the heights of these three classes respectively?

60. Will you name the thirteen short letters?

61. What two short letters are more than a space in height?

62. Will you describe the first principle?

63. Describe the second principle.

64. What do we call the base line or base of a letter? The head line? The top line?

65. Will you measure and analyze the small letter *i*?
66. Will you measure and analyze the small letter *u*?
67. Will you measure and analyze the small letter *w*?
68. Will you measure and analyze the small letter *n*?
69. Will you measure and analyze the small letter *m*?
70. Will you measure and analyze the small letter *v*?
71. Will you measure and analyze the small letter *x*?
72. Will you measure and analyze the small letter *o*?
73. Will you measure and analyze the small letter *a*?
74. Will you measure and analyze the small letter *e*?
75. Will you measure and analyze the small letter *c*?
76. Will you measure and analyze the small letter *r*?
77. Will you measure and analyze the small letter *s*?
78. What four letters do we call semi-extended?
79. Why are these letters called semi-extended?
80. What is the height of *t*, *d*, and *p* above the base line?
81. How far do the *p* and *q* drop below the base line?
82. Will you measure and analyze the small letter *t*?
83. Will you measure and analyze the small letter *d*?
84. Will you measure and analyze the small letter *p*?
85. Will you measure and analyze the small letter *q*?
86. Will you measure the fourth principle, or extended loop?
87. How should the fourth principle, or loop, be formed?
88. Which are the loop, or extended letters?
89. Which principle is the most prominent in the extended letters?
90. What is the length of the loop, or extended letters?
91. Will you measure and analyze the small letter *h*?
92. Will you measure and analyze the small letter *k*?
93. Will you measure and analyze the small letter *l*?
94. Will you measure and analyze the small letter *b*?
95. Will you measure and analyze the small letter *j*?
96. Will you measure and analyze the small letter *y*?
97. Will you measure and analyze the small letter *g*?

98. Will you measure and analyze the small letter *z*?
99. Will you measure and analyze the small letter *f*?
100. Will you measure and analyze long *s*?

CAPITAL LETTERS.

101. What is the height of the capital letters above the base line?
102. What three capitals also drop below the base line, and how far?
103. What class of small letters are of the same height as the capitals?
104. Into how many classes are the capitals divided, and what are they?
105. What is the fifth principle?
106. Will you measure the capital *O*, or fifth principle?
107. What is the sixth principle?
108. Will you measure the sixth principle?
109. What is the seventh principle called?
110. What are the proportions of the capital stem?
111. What three letters, from their general form, may be classed under the fifth principle, or capital *O*?
*112. Will you measure and analyze capital *E*?
113. Will you measure and analyze capital *D*?
114. Will you measure and analyze capital *C*?
115. In which capitals is the sixth principle, or reversed oval, most prominent?
116. Will you measure and analyze capital *X*?
117. Will you measure and analyze capital *W*?
118. Will you measure and analyze capital *Q*?
119. Will you measure and analyze capital *Z*?
120. Will you measure and analyze capital *V*?
121. Will you measure and analyze capital *U*?
122. Will you measure and analyze capital *Y*?

---

*In the analysis of capital letters no attention has been given in respect to flourishes.

123. Will you measure and analyze capital *I*?
124. Will you measure and analyze capital *J*?
125. In what capitals does the seventh principle, or capital stem, chiefly appear?
126. Will you measure and analyze capital *A*?
127. Will you measure and analyze capital *N*?
128. Will you measure and analyze capital *M*?
129. Will you measure and analyze capital *T*?
130. Will you measure and analyze capital *F*?
131. Will you measure and analyze capital *H*?
132. Will you measure and analyze capital *K*?
133. Will you measure and analyze capital *S*?
134. Will you measure and analyze capital *L*?
135. Will you measure and analyze capital *G*?
136. Will you measure and analyze capital *P*?
137. Will you measure and analyze capital *B*?
138. Will you measure and analyze capital *R*?

SPACING.

139. How do you move in spacing and combining small letters in writing words?
140. What is the rule for spacing and combining small letters in words?
141. Which letters cannot be joined according to this rule?
142. When a word begins with a capital letter which does not join to small letters, what is the rule for spacing?
143. What is the general rule for spacing between words composed entirely of small letters?
144. What is the rule for spacing between sentences?
145. What does regular, uniform spacing depend upon?

SHADING.

146. Will you examine your pen and describe it?
147. How do you make light strokes?
148. Describe the manner of producing shaded strokes.

149. How many different forms of shaded strokes are there in writing?

150. Which five letters will illustrate the five forms of shaded strokes?

151. Will you describe the first shade, and name all the letters in which it appears?

152. Will you describe the second shade, and name all the letters in which it appears?

153. Will you describe the third form of shade, and name all the letters in which it appears?

154. Will you describe the fourth form of shade, and name the letters in which it appears?

155. Will you describe the fifth form of shade, and name the letters in which it appears?

156. What is the rule where a shaded letter is doubled?

157. If you wish to attain high excellence in penmanship, what must you do?

WRITING.

ANSWERS.

1. Writing is any thing written or expressed in letters.

2. Take the pen between the first and second fingers and the thumb, observing: *First*, that it crosses the second finger on the corner of the nail; *second*, that it crosses the fore finger forward of the knuckle; *third*, that the end of the thumb touches the holder opposite the lower joint of the fore finger; *fourth*, that the top of the holder points towards the right shoulder; *fifth*, that the wrist is above the paper, and the hand resting lightly on the nails of the third and fourth fingers; *sixth*, that the point of the pen comes squarely to the paper.

3. Four—finger movement, fore-arm movement, combined movement, and whole-arm movement.

4. The finger movement consists in the action of the first and second fingers and thumb, and is used chiefly in making upward and downward strokes.

5. The fore arm movement consists in the action of the fore-arm upon its muscular rest near the elbow; the

hand gliding on the nails of the third and fourth fingers, and may be employed in making strokes in any direction.

6. The combined movement consists in the united action of the fore-arm, acting on its muscular rest as a center, and sliding the hand on the nails of the third and fourth fingers, while the first and second fingers and thumb extend and contract in forming upward and downward strokes.

7. The whole-arm movement consists in the use of the whole arm from the shoulder, the elbow being raised slightly from the desk, and the hand sliding on the nails of the third and fourth fingers.

8. The path of a moving point.

9. There are two.

10. There are straight and curved lines.

11. To make a straight line, the point of the pen or pencil must be moved without change of direction.

12. In order to make a curved line, the pen must be moved with a continuous change of direction.

13. There are two kinds of curved lines; they are called the right curve and the left curve.

14. A right curve bends to the right of a straight line, connecting its extremities.

15. A left curve bends to the left of a straight line, uniting its extremities.

16. There are three kinds—horizontal, vertical, and oblique or slanting lines.

17. A line is said to be horizontal when it is level, or one end is no higher than the other.

18. A line which leans neither to the right nor the left, is said to be vertical.

19. When they are neither vertical nor horizontal.

20. When lines are equally distant from each other throughout their entire length, they are said to be parallel.

21. An angle is the space between two lines that meet in a point.

22. A right angle is the space between two straight lines meeting so as to form a square corner.

23. There is the right angle, acute angle, and obtuse angle.

24. The space between two straight lines meeting so as to form a sharp corner, or any angle less than a right angle.

25. The space between two lines meeting so as to form a blunt corner, or any angle greater than a right angle.

26. We measure angles by the circle.

27. Every circle is divided into 360 equal parts called degrees.

28. One-quarter of 360 degrees, which is 90 degrees.

29. A right angle, or an angle of 90 degrees.

30. An angle of 45 degrees.

*31. An angle of 52 degrees.

32. An angle of 30 degrees.

33. On a slant of 52 degrees.

34. On a slant of 30 degrees.

35. They are slanting.

36. They slant to the right.

37. It is called the main slant.

38. Because it is the slant given to most of the main or downward strokes.

39. The slant of 30 degrees is called the connective slant.

40. Because a majority of the lines, connecting the main or downward strokes in the small letters, are made on the slant of 30 degrees.

41. The height of the small *i*, which is called a space.

42. It is the distance between the two straight lines in the small *u*, taken horizontally, which is equal to three fourths of its slanting or angular height.

43. They are combined angularly by short turns, by oval turns, and by loops.

---

*A circle should be drawn to identify all these points and angles.

44. An angular joining is made by suddenly stopping the motion of the pen at the end of a stroke, and uniting in a point with the stroke following.

45. By simply moving from one stroke to another, as short as possible, without making a point, or stopping the motion of the pen.

46. By increasing an oval curve near its end, so as to unite with its opposite side by a continuous motion, giving proper width.

47. A loop is formed by two opposite curves, united by a short turn at one end, and afterwards crossing.

48. The general form of the oval is that of an egg. The ovals generally used in writing are elliptical, having ends rounded nearly alike.

49. There are two kinds—direct ovals and reversed ovals.

50. Commence at the top, and move downward with a left curve to form the left side, and upward with a right curve to form the right side.

51. Move upward with a left curve to form the left side, and downward with a right curve to form the right side.

52. Principles are the constituent parts of letters.

53. There are seven principles.

54. The first is a straight line; the second is a right curve; the third is a left curve; the fourth is an extended loop; the fifth is a direct oval, or capital *O;* the sixth is a reversed oval; the seventh is the capital stem.

55. The first, second, third and fourth principles.

56. The fifth, sixth, and seventh principles. The others are combined with them in forming the minor parts of the capitals.

57. Each letter of the alphabet has the small and capital form.

58. They are divided into three classes—short, semi-extended, and extended, or looped.

59. The short letters are one space; semi-extended, two spaces; extended, or looped, three spaces.

60. They are: *i*, *u*, *w*, *n*, *m*, *v*, *x*, *o*, *a*, *e*, *c*, *r*, and *s*.

61. The *r* and *s*, which are one-fourth of a space higher than the rest.

62. The first principle is a straight line, usually on the main slant of 32°.

63. The second principle is a right curve, usually on the connective slant of 30°.

64. The line, ruled or imaginary, upon which the letter rests. The horizontal line, ruled or imaginary, at the top of the short letters is sometimes called the head line. The one at the top of the capitals is called the top line.

65. Height, one space; width, two spaces; distance between point and dot, one space. Principles, 2, 1, 2.

66. Height, one space; width, three spaces; distance between straight lines, one space. Principles, 2, 1, 2, 1, 2.

67. Height, one space; whole width, three spaces; distance from straight line to dot, one-half space; and from dot to end of horizontal curve, one-half space. Principles, 2, 1, 2, 1, 2, 2.

68. Height, one space; width, three spaces. Principles, 3, 1, 3, 1, 2.

69. Height, one space; width, four spaces. Principles, 3, 1, 3, 1, 3, 1, 2.

70. Height, one space; whole width, two spaces; width from turn, one-half space, and from dot to end of horizontal curve, one-half space. Principles, 3, 1, 2, 2.

71. Height, one space; whole width, two spaces; openings at top and base of letter, each one-third space. Principles, 3, 2, 3, 2.

72. Height, one space; whole width, one and one-half spaces; width of oval, measured horizontally across the middle, one-half space; distance from top to end of horizontal curve, one-half space. Principles 3, 3, 2, 2.

73. Height, one space; width, three spaces; width of oval, one-half space. Principles, 3, 3, 2, 1, 2.

74. Height, one space; width of loop, one-fourth space; length of loop, two-thirds of a space; entire width of letter, two spaces. Principles, 2, 3, 2.

75. Height, one space; length of top, one-third space; width of top, one-third space, measured at right angles to slant; entire width of letter, two spaces. Principles, 2, 1, 2, 3, 2.

76. Main height, one and one-fourth spaces; whole width, two spaces; width from first curve to shoulder turn, measured horizontally, one-fourth space. Principles, 2, 3, 1, 2.

77. Height, one and one-fourth spaces; width, measured horizontally at one-third of height, one-half of a space; height of dot above base, one-fourth space; entire width, two spaces. Principles, 2, 3, 2, 2.

78. The four semi-extended letters are: *t*, *d*, *p*, and *q*.

79. For the reason, as to length, they are between the short letters and the extended letters.

80. The height is two spaces.

81. They drop below the base line one and one-half spaces.

82. Main height, two spaces; first curve joins descending straight line one space above the base; entire width, two spaces; height of final curve, one space; distance of cross stroke below top, one-half space; length of cross stroke, one space. Principles, 2, 1, 2, 1.

83. Height of first part, one space; full height, two spaces; entire width, three spaces; opening between oval and straight line, one space. Principles, 3, 3, 2, 1, 2.

84. Length above the base line, two spaces; length below, one and one-half spaces; first curve unites with long straight line at top; height of finishing part, one space; entire width, three spaces. Principles, 2, 1, 3, 1, 2.

85. Height above base line, one space; length below, one and one-half spaces; entire width, three spaces; width of part below base line, one-third space. Principles, 3, 3, 2, 1, 2, 3.

86. Height, three spaces; horizontal width of loop, one-half space; length from turn of loop to crossing, two spaces; width on base line, one space.

87. Begin on base line and ascend with a right curve, three spaces; turn short and descend with a slight left curve on main slant, two spaces; then crossing first curve, continue with a straight line on main slant to base.

88. The loop or extended letters are: *h*, *k*, *l*, *b*, *j*, *y*, *g*, *z*, *f*, and long *s*.

89. The fourth principle or extended loop.

90. Three spaces, except the *f* and long *s*, which are five spaces in length, extending three spaces above and two below the base line.

91. Height, three spaces; width of loop measured horizontally, one-half space; crossing of loop, one space above the base; entire width of the letter, three spaces; height of finishing part, one space. Principles, 4, 3, 1, 2.

92. Main height, three spaces; width of loop, one-half space; crossing of loop, one space above base line; distance between the two straight lines, one-half space; between loop crossing and top of first

right curve, one space; between second straight line and top of final curve, one space. Principles, 4, 2, 1, 2.

93. Main height, three spaces; height of loop crossing above base line, one space; height of final curve, one space; main width, two spaces; width of loop, one-half space. Principles, 4, 2.

94. Main height, three spaces; height of loop crossing above base line, one space; entire width of letter, two spaces; width of loop, one-half space; width from crossing to top of first right curve, one-half space; and from the latter, to end of final curve, one-half space. Principles, 4, 2, 2.

95. Height above base line, one space; length below base line, two spaces; main width, two spaces; width of loop, one-half space; height of dot above angle at top, one space. Principles, 2, 4.

96. Height above base line, one space; length below, two spaces; main width, three spaces; proportions of loop, same as in *j*. Principles, 3, 1, 2, 4.

97. Height above base line, one space; length below, two spaces; main width, three spaces; proportions of pointed oval, same as in *a*, *d*, and *q*; proportions of loop, same as in *j*. Principles, 3, 3, 2, 4.

98. Height above base line, one space; length below, two spaces; whole width, two spaces; width of turn at base line, one-fourth space; width of loop, one-half space. Principles, 3, 1, 4.

99. Height above base line, three spaces; length below base line, two spaces; entire width of letter, two spaces; width of loops, each one-half space. Principles, 4, 3, 2, 2.

100. Height above base line, three spaces; length below, two spaces; main width, two spaces; width of loops, each one-half space. Principles, 4, 4.

CAPITAL LETTERS.

101. The height is three spaces.

102. The *J*, *Y*, and *Z* extend two spaces below the base line.

103. The extended or loop letters.

104. The capitals are divided into three classes, according to the principle (fifth, sixth, or seventh) most prominent in their formation.

105. The capital *O* or direct oval.

106. Height, three spaces; width, two spaces, measured at right angles to main slant; distance between the two left curves, one-third space. The two sides of the *O* should curve equally. Principles, 3, 2, 3.

107. The sixth principle is the reversed oval.

108. Height, three spaces; main width, one and one-half spaces; width on base line, one-third space.

109. The seventh principle is called the capital stem.

110. Main height, three spaces; height of base oval, one and one-half spaces; length of oval, two and one-half spaces; slant of oval, fifteen degrees from horizontal.

111. The three letters classed under the fifth principle, are *O*, *E*, *D*.

112. Main height, three spaces; height of large oval, two spaces; width of same, one and one-half spaces; length of top, one-half length of base oval; length of first curve, three-fourths space; length of the smallest loop one-third space. Principles, 3, 2, 3, 5.

113. Main height, three spaces; main width, three fourths of a space; height of stem, two and one half-spaces; length of small loop, three-fourths space; distance between loop and lowest point of oval on base line, two spaces. Principles, 3, 2, 3, 2, 3, 2, 3.

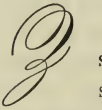
114. Height, three spaces; crossing of loop above base line, one space; width of oval, one and one-half spaces; length of same, two spaces. Principles, 2, 3, 2, 3.

115. It is most prominent in the capitals *X*, *W*, *Q*, *Z*, *V*, *U*, *Y*, *I*, *J*.

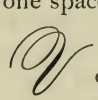
116. Main height, three spaces; main width of reversed oval, one and one-half spaces; distance between parts of *X* at top, one and two-third spaces; at base, one space; point of contact between main parts of letter, one and two-thirds spaces above base. Principles, 6, 3, 2.

117. Main height, three spaces; main width of oval, one and one-half spaces; distance between top of oval and the angle to its right, one and two-thirds spaces; distance on base line between angular joinings, one and two-thirds spaces; distance at top between last two curves, one space; height of final curve, two spaces. Principles, 6, 2, 3, 3.

118. Main height, three spaces; width of oval, one and one-half spaces; length of small loop, one space; height of same, one-fourth space; height of final curve, one space; distance between end of final curve and the reversed oval, one space. Principles, 6, 3, 2.

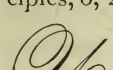


119. Proportions of the reversed oval are the same as in *X*; length of loop below base line, two spaces; width of same, one-half space, full; height of small loop, one-half space; distance from base of small loop to crossing of larger one, one space; final curve ends one space above the base line. Principles, 6, 3, 2, 4.



120. Main height, three spaces; width of oval, one and one-third spaces; width between final curve and straight line at middle height, one-half space;

width between top of final curve and oval, one space. Principles, 6, 2, 3.



121. Main height, three spaces; width of oval, one and one-third spaces; distance between straight lines, one space; opening between second straight line and final curve, one space. Principles, 6, 2, 1, 2.

122. Height above base line, three spaces; length below base line, two spaces; width of oval, one and one-third spaces; height of right portion above base, two spaces; width of loop, one-half space, full; width between straight lines, one space. Principles, 6, 2, 1, 4.

123. Main height, three spaces; width of loop forming top, one space; crossing of loop, one-third space above base line. Principles, 6, 7.

124. Height above base line, three spaces; length below, two spaces; width of upper loop, one space; width of lower loop, one-half space, full; crossing of loops, one-third space above base. Principles, 6, 2, 3.

125. The seventh principle appears in the capitals *A*, *N*, *M*, *T*, *F*, *H*, *K*, *S*, *L*, *G*, *P*, *B*, *R*.

126. Main height, three spaces; height of oval, one and one-half spaces; length of oval, two and one-half spaces; distance between parts of letter on base line, one and two-thirds spaces. Principles, 7, 3, 3, 2.

127. Main height, three spaces; proportions of stem and distance between left curve and stem at base, same as in *A*; height of last curve, two spaces; distance between top of last curve and preceding line, one space. Principles, 7, 3, 3.

128. Main height, three spaces; proportion of stem, same as in *A* and *N;* distance between the two angles at top and the two short turns at base, each one space ; distance between lowest point of stem and first turn to right, one and two-thirds spaces; distance between four long strokes at middle height, each one-third space; distance between two last curves, one space. Principles, 7, 3, 3, 3, 2.

129. Main height, including the cap, three spaces; height of stem, two and one-half spaces; proportions of base oval, same as in *A*, *N*, and *M;* distance (measured at right angles to main slant) between beginning point of cap and the capital stem, one space; the cap should terminate two spaces to right of stem; width of small loop and spaces to right and left, each one-third space. Principles, 7, 3, 2, 3, 2.

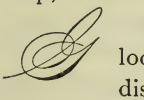
130. Proportions of cap, and also of stem to highest point of base oval, precisely the same as in the *T;* top of characteristic mark, one and one-half spaces above base; length of same, one-fourth space. Principles, 7, 3, 3, 2, 3, 2.

131. Height of right side, three spaces; height of left side, two and one-half spaces; distance between the sides, at top, two spaces; at base, one and two-thirds spaces; the oval of same proportions as in *A*, *N*, and *M*. Principles, 2, 7, 3, 3, 2.

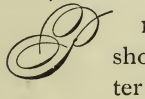
132. Height of right side, three spaces; height of left side, two and one-half spaces; distance between the sides, at top, two spaces; at base, one and two-thirds spaces; height of small loop above base, one and one-half spaces; width of opening between final and its preceding curve, one space. Principles, 2, 7, 3, 2, 2, 3, 2.

133. Main height, three spaces; width of loop, measured horizontally, one-half space; length of loop, one and one-half spaces; length of base oval, two and one-half spaces; height of oval, one and one-half spaces. Principles, 2, 7.

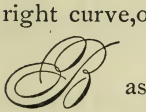
134. Main height, three spaces; width of upper loop, measured horizontally, one-half space; length of same, one and one-half spaces; length of small loop, one space; width of small loop, one-fourth space. Principles, 2, 7, 3, 2.



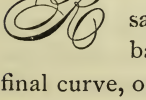
135. Main height, three spaces; width of loop, one-half space; length of loop, two spaces; distance from right side of loop to top of stem, three fourths space; height of stem, one and one-half spaces; length of oval, two and one-half spaces; height of oval, one and one-half spaces. Principles, 2, 3, 2, 7.



136. Full height, three spaces; height of stem should be two and one-half spaces; width of letter at mid-height, one and one-half-spaces, measured at right angles to slant; distance between stem and right curve,one-half space. Principles, 7, 3, 2, 3, 2.



137. Main height, three spaces; stem, same as in *P;* distance between stem and right curves near top and bottom, should be each one-half space; height of small loop, one and one-half spaces; length of same, one-third space. Principles, 7, 3, 2, 3, 2, 2, 3.



138. Principal height, three spaces; stem, same as *B*, and *P;* distance between turns upon base line, one and one-half spaces; height of final curve, one space; distance between same and the preceding one, one space. Principles, 7, 3, 2, 3, 2, 3, 2.

139. The hand slides on the nails of the third and fourth fingers, and is assisted by the first and second fingers and thumb in shaping and joining the lines.

140. In spacing and joining letters in words, carry the connecting curve one and one-fourth spaces to the right of preceding letter.

141. The *a*, *d*, *g*, and *q*, which require the connecting curve to be carried two spaces to the right of the preceding letter, in order to join to their right side.

142. The first curve of the first small letter should be gin within one-fourth of a space of the capital.

*143. The first curve of a word should begin on base one and one-half spaces to the right of the final downward stroke of the preceding word.

144. The spaces between sentences should be twice as great as between words.

145. It depends chiefly upon a good position, and regular, uniform movement. When the latter are secured, the former will not be difficult to attain.

146. The pen is a pointed instrument for writing with ink. It is made of steel (or gold), and is attached to a convenient handle by a clasp; its nib is split through the middle, and the two parts are called the teeth. The two teeth are alike; they are thin and sharp, and, in a good pen, meet so as to form a fine, smooth point.

147. By moving the pen lightly on the paper without springing or spreading the teeth.

148. Shades are made by springing the pen by pressure to spread the teeth, then lightening the pressure, and allowing them to return to place.

149. There are five.

150. The five letters that illustrate the five forms of shaded strokes, are *t*, *p*, *l*, *y*, *O*.

151. The *t* is shaded by pressing at top squarely on the teeth of the pen, and gradually lightening it in descending to base line. The *d* is shaded in the same manner. The letters are *t*, *d*.

---

* This rule causes the beginning point of a word to fall in a vertical line under the final point of the preceding word.

152. The shade of *p* is made by beginning with a slight pressure at base line or middle of stroke, increasing gradually and stopping squarely at lower end. There is a style of small *t*, called "final" *t*, sometimes used, which has the same form of shade. The letters in which it appears are *t* and *p*.

153. The shade of *l* is made by increasing pressure on the pen gradually in descending, and lightening up for the turn. This form of shade occurs in the following letters: *b*, *f*, *l*.

154. The shade of *y* is made by pressing evenly on the pen in descending on the straight line between the turns. This form of shade appears in the following letters: *h*, *k*, *y*, *V*, *U*, *Y*.

155. The shade on the oval, and on all curved lines, is made by increasing the pressure toward middle of curve, and then gradually diminishing it. This shade occurs in the three small letters, *a*, *g*, and *q*, and in all the capitals except the *V*, *U*, and *Y*.

156. The second letter should receive only a half shade.

157. You must master the principles, and faithfully practice them.

ARITHMETIC.

QUESTIONS.

1. What is Arithmetic?
2. How many fundamental operations are there in arithmetic?
3. What is notation? Numeration?
4. How many methods are there of expressing numbers?
5. What is an abstract number? A concrete number?
6. What is a simple number?
7. What is a compound denominate number?
8. What is a demonstration?
9. What is a direct demonstration?
10. What is an indirect demonstration?
11. Define addition. Subtraction.
12. What is analysis in arithmetic?
13. Define multiplication. Division.
14. What is a composite number?
15. What is a factor? A root?
16. What is a multiple of a number?
17. What is a common multiple of two or more numbers?

18. What is the least common multiple of two or more numbers?

19. What is a common divisor?

20. What is the greatest common divisor of two or more numbers?

21. A servant being ordered to lay out equal sums in the purchase of chickens, ducks, and turkeys, and to expend as little money as possible, agreed to forfeit 5 cents for every fowl purchased more than was necessary to obey orders. In the market he found chickens at 12 cents, ducks at 30 cents, and turkeys at two prices — 75 cents and 90 cents — of which he imprudently took the cheaper. How much did he thereby forfeit?

22. How many rails will enclose a field 14,599 feet long by 10,361 feet wide, provided the fence is straight, and 7 rails high, and the rails of equal length, and the longest that can be used?

23. What is a fraction? Decimal fraction?

24. What is the unit of a fraction?

25. What is a fractional unit?

26. What are the terms of a fraction?

27. What is the value of a fraction?

28. A school-boy being asked how many dollars he had, replied that if his money be multiplied by $1\frac{4}{5}$ and $\frac{1}{8}$ of a dollar be added to the product, and $\frac{2}{5}$ of a dollar taken from the sum, this remainder divided by $\frac{6}{25}$ would be equal to the reciprocal of $\frac{4}{5}$ of a dollar. How much money had he?

29. What are duodecimals?

30. What is a mixed number?

31. What is a repeating decimal?

32. What is a repetend?

33. What is a single repetend?

34. What is a compound repetend?

35. Define ratio.

36. What is a simple ratio?

37. What is a compound ratio?

38. What is the single rule of three?

39. If 20 men can perform a piece of work in 15 days, how many men must be added to the number that the work may be accomplished in $\frac{4}{5}$ of the time?

40. What is the double rule of three?

41. If the use of $3750 for 8 months is worth $68.75, what sum is that whose use for 2 years and 4 months is worth $250?

42. What is a partnership or firm?

43. What is capital or stock?

44. What do you understand by the terms profit and loss?

45. What is commission? How is it reckoned?

46. How many thousand shingles will cover both sides of a roof 36 feet long, and whose rafters are 18 feet in length?

47. What is interest? Discount?

48. What is compound interest?

49. The time, rate per cent, and interest being given, how find the principal?

50. The time, rate per cent, and amount being given, how find the principal?

51. The principal, time, and interest being given, how find the rate per cent?

52. The principal, interest, and rate being given, how find the time?

53. What is the face of a note?

54. What is the present value of a note?

55. What is the discount on a note?

56. Knowing the face of a note and rate, how do you find the present value?

57. How much may be gained by hiring money at 5% to pay a debt of $6400, due 8 months hence, allowing the present worth of this debt to be reckoned by deducting 5% per annum discount?

58. A machinist sold 24 grain drills for $125 each. On one-half of them he gained 25 per cent, and on the remain-

der he lost 25 per cent. Did he gain or lose on the whole, and how much?

59. A man bought land at $30 an acre; how much must he ask an acre, that he may abate 25 per cent from his asking price, and still make 20 per cent on the purchase money?

60. What is a corporation?

61. What are banks? Bank notes?

62. What is bank discount? The proceeds of a note?

63. What is the difference between the true and the bank discount of $1375.50 for 60 days at 6 per cent?

64. What is a coupon?

65. What is a dividend? Brokerage?

66. What is an insurance company? What is insurance?

67. A company took a risk at $2\frac{1}{4}\%$, and reinsured $\frac{3}{5}$ of it in another company at $2\frac{1}{2}\%$; the premium received exceeded the premium paid by $72. What was the amount of the risk?

68. A broker in New York exchanged $25,875 on the Suffolk Bank, Boston, at $\frac{1}{4}$ per cent; how much brokerage did he receive?

69. Bought $860 bank stock at 4% advance; sold at a discount of $2\frac{1}{2}\%$; find the loss.

70. A house that cost $8250, rents for $750 a year; the insurance is $\frac{6}{10}\%$, and the repairs $\frac{1}{2}\%$, every year. What rate of interest does it pay?

71. What is the interest of that sum for 243 days at 8%, which at the same time and rate will amount to $11,119.70?

72 A man received $33.25 interest on a sum of money loaned 5 years previous, at 7%; what was the sum lent?

73. What is life insurance? What is tax?

74. What is alligation? Exchange?

75. What is evolution? Involution?

76. The expense of building a public bridge was $1260.52, which was defrayed by a tax upon the property

of the town. The rate of taxation was $3\frac{1}{4}$ mills on $1, and the collector's commission was $3\frac{1}{2}\%$; what was the valuation of the property?

77. A's income is 16% of his capital; he is taxed $2\frac{1}{2}\%$ of his income, and pays $26.04; what is his capital?

78. A wine merchant mixes 12 gallons of wine at $1 per gallon with 5 gallons of brandy worth $1.50 per gallon, and 3 gallons of water of no value; what is the worth of 1 gallon of the mixture?

79. What must be paid in New York for a draft on Boston, at 30 days, for $5400, exchange being at $\frac{1}{2}\%$ premium?

80. A man in Buffalo purchased a draft on St. Paul, Minnesota, for $5320, drawn at 60 days, paying $5141.78; what was the course of exchange?

81. The base and perpendicular of a right-angled triangle are 30 and 40; what is the hypothenuse?

82. A tree 140 feet high, is the center of a circular island 100 feet in diameter; a line 600 feet long reaches from the top of the tree to the further shore; what is the breadth of the stream, the land on each side being of the same level?

83. What is the difference between half a solid foot and a solid half foot?

84. Two ships set sail from the same port, and one sails due east 50 leagues, the other due north 84 leagues; how far are they apart?

85. What is arithmetical progression?

86. What is geometrical progression?

87. What is an analysis? Mensuration?

88. The first term of a descending series is 100, the common difference 7, and the number of terms 13; what is the last term?

89. If the first term of an ascending series be 2, and the common difference 3, what is the 50th term?

90. Of what principal is $150 the compound interest for 2 years, at 7%?

91. A person being asked the time of day, replied, the time past noon is equal to $\frac{1}{5}$ of the time to midnight; what was the hour?

92. A man engaged to write for 20 days, receiving $2.50 for every day he labored, and forfeiting $1 for every day he was idle; at the end of the time he received $43; how many days did he labor?

93. What is the cost of roofing a house 60 feet long and 22 feet 9 inches from the ridge to the eaves, at 36 cents a square yard?

94. What is the cost of painting a wall 14 feet by $9\frac{1}{2}$ feet, at 18 cents a square yard, except a chimney 4 feet 6 inches by 3 feet 10 inches?

95. A, B, and C can do a job of work in 12 days, C can do it in 24 days, and A in 34 days; in what time can B do it alone?

96. Sold $\frac{1}{2}$ of a lot of lumber for what $\frac{5}{8}$ of it cost; what % was gained on the part sold?

97. If a boy buys peaches at the rate of 5 for 2 cents, and sells them at the rate of 4 for 3 cents, how many must he buy and sell to make a profit of $4.20?

98. A farmer sold 34 bushels of corn and 56 bushels of barley for $63.10, receiving 35 cents a bushel more for the barley than for the corn; what was the price of each per bushel?

99. A boy hired to a mechanic for 20 weeks, on condition that he should receive $20 and a coat. At the end of twelve weeks the boy quit work, when it was found that he was entitled to $9 and the coat; what was the value of the coat?

100. A broker buys stock when it is 20% below par, and sells it when it is 16% below par; what is his rate of gain?

101. A general, forming his army into a square, had 284 men remaining; but increasing each side by one man, he wanted 25 men to complete the square; how many men had he?

102. After spending 25% of my money, and 25% of the remainder, I had left $675; what had I at first?

103. I bought a horse for $156 due in 8 months, and sold him at once for $180; find the gain per cent, interest $4\frac{1}{2}\%$.

104. A boat goes $16\frac{1}{4}$ miles an hour down stream, and 10 miles an hour up stream; if it is $22\frac{1}{2}$ hours longer in coming up than in going down, how far down did it go?

105. A hare having 45 rods the start of a dog, can run 25 rods while the dog runs 28 rods; how many rods must the dog run to catch the hare?

106. I was married at the age of 21; if I live 19 years longer I will have been married 60 years; what is my age?

107. A cistern is $\frac{2}{3}$ full of water; after 35 gallons are taken out, it is $\frac{3}{8}$ full; how many gallons will it contain?

ARITHMETIC.

ANSWERS.

1. Arithmetic is the science of numbers, and also the art of applying numbers to practical purposes.

2. There are five—notation, numeration, addition, subtraction, multiplication, and division.

3. Notation is the method of expressing numbers, either by letters or figures. Numeration is the art of reading, correctly, any number expressed by letters or figures.

4. There are three: (*a*) By words, or common language; (*b*) by letters, called the Roman method; (*c*) by figures, called the Arabic method.

5. An abstract number is a number used without reference to any particular thing or quantity; as, 3, 24, 756. A concrete number is a number used with reference to some particular thing or quantity; as, 21 hours, 6 cents, 120 miles.

6. A simple number is a single unit, or a single collection of units, either abstract or denominate.

7. A compound denominate number is one expressed by two or more different units; as, 1 yard, 2 feet, 6 inches.

8. A demonstration is a process of reasoning by which a proposition is shown to be true.

9. A direct demonstration is one which commences with known truths, and by a chain of reasoning establishes the proposition to be proved.

10. An indirect demonstration is one which assumes the proposition to be false, and then proves that some absurdity will necessarily follow.

11. Addition is the operation of finding the sum of two or more numbers. Subtraction is the difference between two numbers.

12. Analysis in arithmetic is the process of investigating principles and solving problems, independently of fixed rules.

13. Multiplication is the operation of taking one number as many times as there are units in another. Division, of dividing a number into equal parts.

14. A composite number is one produced by multiplying two or more numbers together. Thus, 60 is a composite number, because $3\times4\times5=60$.

15. A factor is any one of the numbers which, multiplied together, produce a composite number. Thus, 3, 4, and 5 are factors of the composite number 60. A root is a factor repeated to produce a power.

16. A multiple of a number is any product of which the number is a factor; hence, any multiple of a number is exactly divisible by the number itself.

17. A common multiple of two or more numbers is any number which each will divide without a remainder.

18. The least common multiple of two or more numbers is the least number which they will separately divide without a remainder.

19. A common divisor of two or more numbers is any number that will divide each of them without a remainder; hence, it is always a common factor of the numbers.

20. The greatest common divisor of two or more numbers is the greatest number that will divide each of them without a remainder; hence, it is their greatest common factor.

21. He must spend in the purchase of each kind of fowls a sum equal to the least common multiple of the prices paid. Suppose he takes the cheaper turkeys: the least common multiple of 12, 30, and 75 is 300; and $300 \div 12 = 25$, number of chickens; $300 \div 30 = 10$, number of ducks; $300 \div 75 = 4$, number of turkeys; and $25 + 10 + 4 = 39$, the whole number of fowls purchased. Next suppose he takes the turkeys at the higher price: the least common multiple of 12, 30, and 90 is 180; and $180 \div 12 = 15$, number of chickens; $180 \div 30 = 6$, number of ducks; $180 \div 90 = 2$, number of turkeys; and $15 + 6 + 2 = 23$, whole number of fowls. But $39 - 23 = 16$, number of fowls purchased more than was necessary; and $16 \times 5 = 80$ cents, *Ans.*

22. The greatest common divisor of 14,599 feet and 10,361 feet is 13 feet, the length of one joint in the fence $(14{,}599 + 10{,}361) \times 2 = 49{,}920$ feet, the entire length of the fence; $49{,}920 \div 13 = 3{,}840$, the number of joints in the fence; and $3{,}840 \times 7 = 26{,}880$, the number of rails, *Ans.*

23. A fraction is one or more of the equal parts of a unit. A decimal fraction is one whose unit is divided according to the scale of tens.

24. The unit of a fraction is a single thing that is divided into equal parts.

25. A fractional unit is one of the equal parts of the unit that is divided.

26. The terms of a fraction are the numerator and denominator taken together; hence, every fraction has two terms.

27. The value of a fraction is the quotient of the numerator divided by the denominator.

28. The reciprocal of $\frac{4}{5}$ is $\frac{5}{4}$; reversing the fourth operation, $\frac{5}{4} \times \frac{6}{25} = \frac{3}{10}$; reversing the third operation, $\frac{3}{10} + \frac{2}{5} = \frac{7}{10}$; reversing the second operation, $\frac{7}{10} - \frac{1}{6} = \frac{8}{15}$; reversing the first operation, $\frac{8}{15} \times \$1\frac{5}{14} = \$\frac{4}{7}$, *Ans.*

29. Duodecimals are a system of numbers which arise from dividing a unit according to the scale of 12. The

units divided are, the foot in length, the square foot, and the cubic foot.

30. A mixed decimal is one composed of a whole number and a decimal.

31. A repeating decimal is a decimal in which a single figure, or a set of figures, is constantly repeated.

32. A repetend is a single figure, or a set of figures, which is constantly repeated.

33. A single repetend is one in which only a single figure is repeated, as $\frac{2}{9}$=.2222+, or $\frac{3}{9}$=.3333+.

34. A compound repetend has a set of figures, repeated; thus $\frac{1}{3}\frac{9}{3}$=.5757 + and $\frac{5}{9}\frac{7}{9}\frac{2}{9}\frac{3}{9}$=57235723 + are compound repetends, and are distinguished by marking the first and last figures of the set.

35. Ratio is the comparison of two numbers with each other.

36. A simple ratio is when both terms are simple numbers; thus, 7: 12 is a simple ratio.

37. A compound ratio is one which arises from the multiplication of two simple ratios.

38. The single rule of three is the process of finding from three given numbers a fourth, to which one of them shall have the same ratio as exists between the other two.

39. $\frac{4}{5}$ of 15 days=12 days; and since the number of men required will vary inversely as the time, 20 men$\times\frac{1}{1}\frac{5}{2}$= 25 men required to perform the work in 12 days; 25 men— 20 men=5 men to be added, *Ans.*

40. The double rule of three is an application of the principles of compound proportion.

41. 2 years, 4 months=28 months; $\frac{2}{6}\frac{5}{8}\frac{0}{-7}\frac{}{5}=\frac{4}{1}\frac{0}{1}$; \$3750 $\times\frac{8}{2}\frac{}{8}\times\frac{4}{1}\frac{0}{1}$=\$3896.10+, *Ans.*

42. A partnership or firm is an association of two or more persons, under an agreement to share the profits and losses of business.

43. Capital or stock is the amount of money or property contributed by the partners, and used in the business.

44. Profit and loss are commercial terms, indicating gain or loss in business transactions. The gain or loss is always estimated on the cost price.

45. Commission is an allowance made to an agent for a transaction in business. It is reckoned at a certain rate per cent on the amount of money used.

46. $18\times2=36$; $36\times36=1296$ square feet in both sides of the roof. But 1296 square feet$=$12.96 squares of 100 feet each; and since 1000 shingles make 1 square, there will be 12.96 M. shingles.

47. Interest is a percentage paid for the use of money. Discount is an allowance made for the payment of money before it is due.

48. Compound interest is interest on both principal and interest, when the interest is not paid when due.

49. Divide the given interest by the interest of $1 for the given time at the given rate.

50. Divide the given amount by the amount of $1 for the given time at the given rate.

51. Divide the given interest by the interest on the principal for the given time at 1 per cent.

52. Divide the given interest by the interest on the principal for 1 year; the quotient will be the required time in years and decimals.

53. The face of a note is the amount named in a note.

54. The present value of a note is such a sum as being put at interest until the note becomes due, would increase to an amount equal to its face.

55. The discount on a note is the difference between the face of the note and its present value.

56. Divide the face of the note by $1 plus the interest of $1 for the given time.

57. 5% per annum is $3\frac{1}{3}$% for 8 months; hence, \$6400 $\times.03\frac{1}{3}=\$213.33\frac{1}{3}$ discount; $\$6400-\$213.33\frac{1}{3}=\$6186.66\frac{2}{3}$ to be hired; $\$6186.66\frac{2}{3}\times.03\frac{1}{3}=\$206.22\frac{2}{9}$ interest on hired money; $\$213.33\frac{1}{3}-\$206.22\frac{2}{9}=\$7.11\frac{1}{9}$, *Ans.*

58. $125×12=$1500, received for each half; $1500÷$1.25=$1200, cost of one-half; $1500÷.75=$2000, cost of the other half; $1200+$2000=$3200, cost of the whole; $1500×2=$3000, received for the whole; $3200—$3000=$200 lost, *Ans.*

59. $30×$1.20=$36, selling price; $36÷.75=$48, asking price, *Ans.*

60. A corporation is a collection of persons authorized by law to do business together. The instrument which defines their rights and powers is called a charter.

61. Banks are corporations for the purpose of receiving deposits, loaning money, and furnishing a paper circulation represented by specie. Bank notes are the notes made by a bank to circulate as money, and should be payable in specie, on presentation at the bank.

62. Bank discount is the deduction made by a bank from the face of a note due at a future time. The proceeds of a note is the difference between its face and the discount.

63. $1375.50÷1.01=$1361.88, true present worth; $1375.50—$1361.88=$13.62, true discount; $1375.50×.01=$13.76, bank discount; $13.76—$13.62=$.14, *Ans.*

64. A coupon is a due-bill for interest, attached to bonds or certificates of stock, and payable at specified times.

65. A dividend is a profit divided among the stockholders, and is generally estimated at a certain rate per cent on the par value of the stock. Brokerage is a commission made to an agent for buying and selling stock, uncurrent money, or bills of exchange.

66. An insurance company is a company chartered to insure against risks. Insurance is an indemnity for loss or injury. It is made by companies or individuals, in consideration of a certain sum paid.

67. .025×$\frac{3}{5}$=.015, the per cent of the policy paid for reinsuring; hence, .0225—.015=.0075; and $72÷.0075=$9600, *Ans.*

68. 1% of $25,875=$258.75; $\frac{3}{4}$ of $258.75=$194.0625,

$\frac{3}{4}\%$; \$258.75−\$194.0625=\$64.6875, amount of brokerage received.

69. \$860 × 1.04=\$894.40 cost; \$860×.97$\frac{1}{2}$=\$838.50 sold for; \$894.40—\$838.50=\$55.90, *Ans.*

70. $\frac{6}{10}\%+\frac{1}{2}$=1.1%; 1.1% of \$8250= \$90.75; \$750.00-- \$90.75=\$659.25; interest of \$8250 for one year at 1%= \$82.50; \$659.25÷\$82.50=8%, *Ans.*

71. The amount of \$1 for 243 days is \$1.054; \$11119. 70÷1.054=\$10550, sum at interest; \$11119.70—\$10550= \$569.70, *Ans.*

72. \$.35, interest of \$1 for 5 years at 7%; \$33.25÷ .35=\$95, *Ans.*

73. Life insurance is an agreement to pay, in consideration of a premium, a specified amount to parties named in the agreement, in case of the death of the party insured. A tax is a certain sum required to be paid by the inhabitants of a town, county, or state, for the support of government.

74. Alligation is the process of mixing substances in such a manner that the value of the compound shall be equal to the sum of the values of the several ingredients. Exchange is a term which denotes the payment of money by a person residing in one place to a person residing in another.

75. Evolution is the operation of finding the root of a number; that is, of finding one of its equal factors. Involution is the operation of finding the powers of numbers.

76. \$1260.52÷.965=\$1306.24+, tax to be assessed; \$1306.24÷.00325=\$401,920, base of taxation, or valuation of property, *Ans.*

77. $2\frac{1}{2}\%$ of 16%=$\frac{2}{5}\%$; \$26.04÷$\frac{2}{5}$×100=\$6510, *Ans.*

78. \$1.00×12=\$12.00; \$1.50×5=\$7.50; 12+5+3 =20; \$12.00+\$7.50=\$19.50; \$19.50÷20=.975, *Ans.*

79. \$1.005—\$.0064$\frac{1}{6}$=\$.9985$\frac{5}{6}$, cost of exchange for \$1; \$5400×.9985$\frac{5}{6}$=\$5392.35+, *Ans.*

80. \$5141.78÷5320=\$.9665, cost of exchange for \$1; the interest of \$1 for 63 days=.01225; \$.9665+.01225=

$.97875, course of exchange; $1—$.97875=.02125=2⅛%, rate of discount, *Ans.*

81. $30^2=900$; $40^2=1600$; $1600+900=2500$; $\sqrt{2500}=50$, *Ans.*

82. $600^2=360000$; $140^2=19600$; $360000-19600=340400$; $\sqrt{340400}=583.43+$; $100\div2=50$; $583.43-50=533.43+$, *Ans.*

83. A solid half foot is a cube, each side of which is 6 inches; it contains $6\times6\times6=216$ cubic inches; half a cubic foot $=\frac{1}{2}$ of $1728=864$ cubic inches; $864-216=648$ cubic inches, *Ans.*

84. $84^2+50^2=9556$; $\sqrt{9556}=97.75+=337.23+$ miles, *Ans.*

85. Arithmetical progression is a series of numbers in which each is derived from the one preceding, by the addition or subtraction of the same number.

86. Geometrical progression is a series of terms, each of which is derived from the preceding one by multiplying it by a constant number.

87. An analysis is an examination of the separate parts of a proposition, and of the connection of those parts with each other. Mensuration is the art of measuring, and embraces all the methods of determining the contents of geometrical figures.

88. $(13-1)\times7=84$; $100-84=16$, *Ans.*

89. $(50-1)\times3=147$; $147+2=149$, *Ans,*

90. To find the compound interest on $1, we have $1 = first term, $1.07 = ratio, 3 = number of terms; $1\times\$1.07^2=\$1.1449$, amount; $1.1449—$1=$.1449, interest of $1; $150\div.1449=\$1035.196+$, *Ans.*

91. If the time passed since noon is equal to $\frac{1}{5}$ of the time to midnight, both intervals, or 12 hours, must be $1\frac{1}{5}$ times the time to midnight; hence, 12 hours $\div 1\frac{1}{5} = 10$ hours to midnight; 12 hours—10 hours = 2 hours P. M., *Ans.*

92. On every idle day he lost the forfeit, $1, and his wages, $2.50, which together amount to $3.50. Had he labored every day he would have received $2.50\times20=\$50$.

$50—$43=$7, what he lost by being idle; and $7÷$3.50 =2, the number of idle days. Hence, 20—2=18, the number of days he labored, *Ans.*

93. 60 feet × 22¾ feet × ?=2730 square feet=303⅓ square yards; 36cts.×303⅓=$109.20, *Ans.*

94. 14 feet×9½ feet=133 square feet; 4½ feet×3⅝ feet =17¼ square feet; 133—17¼=115¾ square feet; 18 cts. × 115¾÷9=$2.31½, *Ans.*

95. A, B, and C do ¹/₁₂ of it in 1 day; C does ¹/₂₄ of it, and A ¹/₃₄; hence, B can do ¹/₁₂ —(¹/₂₄+¹/₃₄)=⁵/₄₀₈ in 1 day; and 408÷5=81⅗ days, *Ans.*

96. Since, if sold at cost, ½ of the lot should have sold for only ½ of the cost, the gain on ½ was ⅝—½=⅛ of the cost; and ⅛÷½=25%, *Ans.*

97. ¾—⅖=⁷/₂₀ cents, profit on 1 peach; 420÷⁷/₂₀=1200, *Ans.*

98. Had he received $.35 per bushel less for the barley, the whole cost would have been $.35×56=$19.60 less, or $63.10—$19.60 = $43.50. But in this case, the prices of barley and corn would be equal; hence, 56+34 =90 bushels, whole quantity; $43.50÷90=$.48⅓, price of corn; $.48⅓ +$.35=$.83⅓, price of barley.

99. The difference between the coat and $20, and the coat and $9, is $20—$9=$11; which must be the ratable wages for 20—12=8 weeks. Hence, $11÷8=$1⅜, one week's wages; $1⅜×20=$27.50, wages for 20 weeks; and $27.50—$20=$7.50, value of coat.

100. 100%—20=80%, buying price; 100%—16%= 84%, selling price; 84%—80%=4%; 4%÷80%=5%, *Ans.*

101. It is evident that to increase the numbers in both rank and file by 1 man would require twice the number in rank and file at first, plus 1 (for the man at the corner). And, since to effect this requires 284+25=309 men, $\frac{309-1}{2}$ =154 is the number of men in rank or file at first. Hence, $154^2+284=24{,}000$, *Ans.*

102. 100%—25%=75%; 25% of 75%=$18\frac{3}{4}$%; 75%—$18\frac{3}{4}$%=$56\frac{1}{4}$%=$675; 1%=$12, and 100%=$1200, *Ans.*

103. Amount of $180 for 8 months at $4\frac{1}{2}$%=$185.40; it would have amounted to the same thing if the horse had been bought for $156, and sold for $185.40, both at 8 months; $185.40—$156=$29.40; $29.40×100÷$156 =$18\frac{11}{13}$%, *Ans.*

104. It goes down 1 mile in $\frac{1}{16\frac{1}{4}}=\frac{4}{65}$ hours, and up 1 mile in $\frac{1}{10}$ hour; $\frac{1}{10}-\frac{4}{65}=\frac{1}{26}$ hour longer in going up 1 mile than in going down the same distance; $22\frac{1}{2}\div\frac{1}{26}=585$ miles, *Ans.*

105. In running 28 rods the dog gains 3 rods, but the hare has 45 rods=15×3 rods the start; therefore the dog must run 28 times 15 rods =420 rods, to catch the hare.

106. 60—19=41 years, the time since marriage; 41+21 =62 years, *Ans.*

107. $\frac{2}{3}-\frac{3}{8}=\frac{16}{24}-\frac{9}{24}=\frac{7}{24}$. If $\frac{7}{24}$=35 gallons, $\frac{1}{7}$ of 35 gallons, which is 5 gallons, will be $\frac{1}{24}$, and the cistern, when full, will contain 5×24=120 gallons, *Ans.*

PHILOSOPHY.

QUESTIONS.

1. What is Philosophy?
2. Define matter. A body. A substance.
3. Name the two kinds of properties which belong to each substance.
4. What is the principal distinction between philosophy and chemistry?
5. Name the general properties of matter.
6. Define magnitude. Size.
7. Why is it necessary to have a standard of measure?
8. Define impenetrability.
9. Give some apparent exceptions, and explain them.
10. Define divisibility.
11. Is there any limit to the divisibility of matter?
12. Explain the atomic theory.
13. Define porosity.
14. Define inertia.
15. Why is it difficult to start a heavy wagon?
16. Why is it dangerous to jump from the cars when in motion?
17. Define indestructibility.

18. Name the specific properties of matter.
19. Define a *ductile* body.
20. Mention some of the most ductile metals.
21. Define a *malleable* body.
22. Is copper malleable?
23. Define a *tenacious* body.
24. Name the three kinds of elasticity.
25. Define a molecular force.
26. What two opposing forces act between the molecules of matter?
27. Define cohesion.
28. Define adhesion.
29. What is the object of the spout on a pitcher?
30. What is the law of gravitation?
31. Why does a stone fall to the ground?
32. Define gravitation. Gravity. Weight.
33. What would be the weight of a body at the center of the earth?
34. Describe the weight of a body above the surface of the earth.
35. Does the weight of a body vary on different portions of the surface of the earth?
36. Define the center of gravity.
37. Give some physiological applications of the center of gravity.
38. Define the pendulum.
39. Does a clock gain or lose time in the winter?
40. Why do not drops of water falling from the clouds, strike with a force proportional to the laws of falling bodies?
41. Define motion. Absolute motion. Relative motion.
42. Define rest. Velocity. Force.
43. What are the resistances to motion?
44. Tell what you can about friction.
45. Define momentum.
46. Mention two laws of motion.

47. Define circular motion.
48. Define reflected motion.
49. How is curved motion produced?
50. Is perpetual motion practicable?
51. Define hydrostatics.
52. How do modern engineers carry water across a river?
53. Did the ancients understand this principle?
54. Why are artesian wells so named?
55. Define the water level.
56. Describe the spirit level.
57. Define specific gravity.
58. Where is the center of gravity in a floating body?
59. How do fish sink at pleasure?
60. Why does the firing of a cannon sometimes bring to the surface the body of a drowned person?
61. Why does the body of a drowned person generally come to the surface of the water after a time?
62. If a ship founders at sea, to what depth will she descend?
63. Define hydraulics.
64. Tell something of the flow of water in rivers.
65. How are waves produced?
66. Define pneumatics.
67. Describe the barometer.
68. What are its uses?
69. What opposing forces act on the air?
70. How high does the air extend?
71. How does its density vary?
72. The rise and fall of the barometric column shows that the air is lighter in foul and heavier in fair weather; why is this?
73. Why is it so tiresome to walk in miry clay?
74. Define acoustics.
75. Name and define the two senses of this word.
76. Describe sound as used in the subjective sense.
77. Describe sound as used in the objective sense.

78. Upon what does the velocity of sound depend?
79. Why is this true?
80. At what rate does sound travel in the air?
81. At what rate does sound travel in the water? In iron?
82. Do all sounds travel at the same rate?
83. Define reflection of sound.
84. Why are sounds more distinct at night than by day?
85. What is the difference between noise and music?
86. How can two sounds produce silence?
87. How is the sound produced in wind instruments?
88. Define optics.
89. What is a luminous body?
90. Define a non-luminous body.
91. Define a medium. A transparent body.
92. Give three laws of light.
93. What is the velocity of light?
94. Define a translucent body. An opaque body.
95. Explain the undulatory theory of light.
96. Name and define the three kinds of mirrors.
97. What is the general principle of mirrors?
98. What is a mirage?
99. Give the cause of mirage.
100. Name the seven primary colors of the *solar spectrum.*
101. Define diffraction.
102. How is the rainbow formed?
103. How are halos formed?
104. Explain spherical aberration.
105. Explain chromatic aberration.
106. Explain its remedy.
107. Describe the microscope.
108. Describe the telescope.
109. Describe the opera-glass.
110. Describe the camera.
111. What must be the size of a glass in order to reflect a full length image of a person?

112. Why does a blow on the head make one "see stars?"

113. Define luminous heat. Obscure heat.

114. Define a diathermanous body. Cold.

115. Name the sources of heat.

116. Can force be destroyed?

117. Why does heat expand and cold contract?

118. Give the theory of vaporization.

119. Describe the theory of boiling.

120. Why does salt water boil at a higher temperature than fresh water?

121. Define evaporation.

122. Describe vacuum pans.

123. Explain the relation between absorption and reflection.

124. Why does ice form at night on the Desert of Sahara?

125. Describe the steam engine.

126. Describe the governor.

127. What is the object of a fly-wheel?

128. How is dew formed?

129. Upon what objects will it collect most readily?

130. Why will dew not form on windy nights?

131. Is a heavy dew a sign of rain?

132. Why is there no frost on cloudy nights?

133. How are fogs formed?

134. Describe the formation of clouds.

135. Why are mountains "cloud-capped?"

136. Describe the *nimbus* cloud. The *stratus*.

137. Describe the *cumulus* cloud.

138. Describe the *cirrus* cloud. The *cirro-cumulus*.

139. Describe the *cirro-stratus* cloud. The *cumulo-stratus*.

140. Describe the formation of rain.

141. How are winds produced?

142. Describe land and sea breezes.

143. Describe the trade-winds.

144. Describe the oceanic currents.
145. Tell about the Gulf Stream.
146. What causes the singing of a teakettle?
147. What causes the snapping of wood when laid on the fire?
148. What gives the blue color to air?
149. Define electricity.
150. Name the different forms of electricity.
151. Define magnetism. A magnet.
152. Define magnetic induction.
153. Describe the compass.
154. Is the needle true to the pole?
155. Does the earth induce magnetism?
156. Define frictional electricity.
157. Define the electroscope.
158. Define the difference between *static* and *dynamic* electricity.
159. What is the theory of electricity?
160. Is it a polar force?
161. Define a conductor. An insulator.
162. What is the best conductor? Best insulator?
163. Can electricity be collected from an iron rod?
164. Define electrical induction.
165. Describe the Leyden jar.
166. How is the jar charged?
167. In what manner is the jar discharged?
168. What is the cause of lightning?
169. What is the cause of thunder?
170. What is the cause of the aurora borealis?
171. What is the intimate relation between the aurora and magnetism?
172. Tell what you can about lightning rods.
173. In what consists the main value of the rod?
174. Does the lightning ever pass upward from the earth?
175. Has nature provided any lightning rods?
176. What is the velocity of electricity?

177. Compare frictional and galvanic electricity.

178. Define the process of electrotyping.

179. Define the process of electro-plating.

180. What is the effect of a voltaic current on a magnetic needle?

181. What is a galvanometer?

PHILOSOPHY.

ANSWERS.

1. Philosophy is a knowledge of phenomena as explained by, and resolved into, causes and reasons, powers and laws.

2. Matter is anything we can observe with our senses. A body is a separate portion of matter. A substance is any one of the various kinds of matter.

3. Each substance possesses two kinds of properties —general and specific.

4. Philosophy treats of the physical, and chemistry of the chemical, changes of matter.

5. The most important are magnitude, impenetrability, divisibility, porosity, inertia, and indestructibility.

6. Magnitude is the property of occupying space. Size is the amount of space a body fills.

7. Because every body has three dimensions — length, breadth, and thickness; and, in order to measure these, some standard is required.

8. Impenetrability is the property of so occupying space as to exclude all other bodies; for no two bodies can occupy the same space at the same time.

9. We sometimes speak of one substance penetrating another. Thus, a needle penetrates cloth, a nail penetrates wood, etc.; but by a moment's examination it will be plainly seen that they merely push aside the fibres of the cloth or wood, and so press them closer together.

10. Divisibility is that property of a body which allows it to be separated into parts. It would be impossible to find a particle so small that it still could not be made smaller.

11. Practically speaking, there is not; but philosophers hold that there is in theory.

12. The atomic theory supposes that matter is composed of inconceivably minute portions called atoms, each having a definite shape, weight, color, etc., which cannot be changed by any chemical or physical force. No one has ever seen one of these ultimate portions of matter, and we have no absolute proof that any exist.

13. Porosity is the property of having pores. By this is meant not only such pores as are familiar to all, and to which we refer when in common language we speak of a porous body, as bread, wood, unglazed pottery, a sponge, etc., but a finer kind, which are as invisible to the eye as the atoms themselves. These pores are caused by the fact that the molecules of which a body is composed are not in actual contact, but are separated by extremely minute spaces.

14. Inertia is the property of passiveness. Matter has no power of putting itself in motion when at rest. A body will never change its place unless moved, and if once started will move forever unless stopped.

15. Because we have to overcome its inertia, which tends to keep it at rest. When the wagon in is motion it requires as great an exertion to stop it, since then we have again to overcome its inertia, which tends to keep it moving.

16. Inertia causes the danger. The body has the speed of the train, while the motion of the feet is stopped by contact with the ground. One should jump as nearly as he can in the direction in which the train is moving, and

with his muscles strained, so as to break into a run the instant his feet touch the ground. Then with all his strength he can gradually overcome the inertia of his body, and after a few feet can turn as he pleases.

17. Indestructibility is the property which renders matter incapable of being destroyed. No particle of matter can be annihilated, except by God, its creator. We may change its form, but we cannot deprive it of existence.

18. These are properties which are found only in particular kinds of matter. The most important are ductility, malleability, tenacity, elasticity, hardness, and brittleness.

19. A ductile body is one which can be drawn into wire.

20. Some of the most ductile are gold, silver, and platinum.

21. A malleable body is one which can be hammered or rolled into sheets. Gold is one of the most malleable of all metals.

22. Copper is so malleable that it is said that a workman, with his hammer, can beat out a kettle from a solid block of the metal.

23. A tenacious body is one which cannot be easily pulled apart. Iron is the most tenacious of the metals.

24. Elasticity of compression, elasticity of expansion, and elasticity of torsion.

25. Molecular forces exist in the molecules of matter, and act only at insensible distances.

26. An attractive and a repulsive force, and the latter is heat. There are three kinds of the former—cohesion, adhesion, and chemical affinity.

27. Cohesion is the force which holds together molecules of the same kind.

28. Adhesion is the force which holds together molecules of different kinds.

29. The water would run down the side of the pitcher by the force of adhesion, but the spout throws it into the hands of gravitation before adhesion can catch it.

30. That every particle of matter in the universe attracts every other particle of matter with a force directly proportional to its mass, and decreasing as the square of the distance increases.

31. Because the earth attracts it; but the stone also attracts the earth. The force of the attraction is in proportion to their relative mass. They each move to meet the other, but the stone passes through as much greater distance than the earth as its mass is less.

32. Gravitation is the general term applied to the attraction that exists between all bodies in the universe. Gravity is used to designate the earth's attraction for all terrestrial bodies; it tends to draw them toward the center of the earth. Weight is the measure of the force of gravity.

33. It would weigh nothing; because the attraction is there equal in every direction.

34. The weight of a body above the surface of the earth decreases as the square of its distance from the center of the earth increases.

35. It does. It will be least at the equator: (1) because, on account of the bulging form of our globe, a body is there pushed out from the mass of the earth, and so removed from the center of attraction; (2) because the centrifugal force is there the strongest. It will be greatest at the poles: (1) because, on account of the flattening of the earth, a body is there brought nearer its mass and the center of attraction; (2) because there is no centrifugal force at those points.

36. The center of gravity is that point on which, if supported, a body will balance itself.

37. When we wish to rise from a chair, we bend forward, in order to bring the center of gravity over our feet; our muscles not having sufficient strength to raise our bodies without this aid. And when we walk, we lean forward, so as to bring the center of gravity as far in front as possible.

38. The pendulum consists of a weight so suspended as to swing freely. Its movements to and fro are termed vibrations or oscillations. The path through which it passes is called the arc, and the extent to which it goes in either direction is styled its amplitude.

39. As "heat expands and cold contracts," a pendulum increases in length in summer and shortens in winter. Therefore, a clock loses time in summer and gains in winter.

40. It is because they are so small that the resistance of the air nearly destroys their velocity. If it were not for this wise provision, a shower of rain-drops would be as fatal as one of minie bullets.

41. Motion is a change of place. Absolute motion is a change without reference to any other object. Relative motion is a change with reference to some other object.

42. Rest is either absolute or relative. Velocity is the rate at which a body moves. Force is that which tends to produce or destroy motion.

43. The principal ones are friction, resistance of the air, and gravity.

44. Friction is the resistance caused by the surface over which a body moves. If the surface of a body could be made perfectly smooth, there would be no friction; but in spite of the most exact polish, the microscope reveals minute projections and cavities.

45. Momentum is the quantity of motion in a body.

46. (1) A body once set in motion tends to move forever in a straight line. (2) A force acting upon a body in motion or at rest, produces the same effect, whether it acts alone or with other forces.

47. Circular motion is a variety of compound motion produced by two forces, called the centrifugal and the centripetal. The former tends to drive a body from the center; the latter tends to draw a body toward the center.

48. Reflected motion is produced by the reaction of any surface against which an elastic body is thrown.

49. Whenever two or more instantaneous forces act upon a body, the resultant is a straight line. When one is instantaneous and the other continuous, it is a curved line. And when a body is thrown into the air, unless it be in a vertical line, it is acted upon by the instantaneous force of projection and the continuous force of gravity, and so passes through a line which curves toward the earth.

50. It is not. Nothing can be more utterly impracticable than to make a machine capable of perpetual motion. No machine can produce power; it can only direct that which is applied to it. We know that in all machinery there is friction; hence, this must ultimately exhaust the power and bring the motion to rest. These principles show the uselessness of all such attempts.

51. Hydrostatics treats of liquids at rest; its principles apply to all liquids, but water, on account of its abundance, is taken as the type of the class, and all experiments are based upon it.

52. They simply carry the water in pipes through the valley, or under the bed of the river, knowing that it will rise on the opposite side to its level.

53. They appeared to have understood the principle, but could not make pipes capable of resisting the pressure.

54. Artesian wells are so named because they have been used for a long time in the province of Artois, in France; they were, however, employed by the Chinese from early ages for the purpose of procuring gas and salt water.

55. The surface of standing water is said to be level; this is true for small sheets of water, but for larger bodies an allowance must be made for the circular figure of the earth.

56. The spirit level is an instrument used by builders for leveling; it consists of a slightly curved glass tube, so nearly full of alcohol that it holds only a bubble of air. When the level is horizontal, the bubble remains at the center of the tube.

57. Specific gravity is the weight of a substance compared with the weight of the same bulk of another substance. It is really a method of finding the density of a body. Water is taken as the standard for solids and liquids, and air for gases.

58. A body floating in water has its center of gravity at the lowest point.

59. Fish are provided with an air-bladder, placed near the spine, by means of which they can rise or sink at pleasure.

60. Because by the concussion it shakes the body loose from the mud, or any object with which it is entangled.

61. It is because the gases which are generated by decomposition in the body render it lighter.

62. It is a poetical thought that ships may thus sink into submarine currents, and be carried hither and thither with their precious cargoes of freight and passengers, on voyages that know no end, and toward harbors that they never reach.

63. Hydraulics treats of liquids in motion. In this, as in hydrostatics, water is taken as the type. In theory, its principles are those of falling bodies, but they are so modified by various causes that in practice they cannot be relied upon, except as verified by experiment. The discrepancy arises from changes of temperature, which vary the fluidity of the liquid, from friction, the shape of the orifice, etc.

64. A fall of only three inches per mile is sufficient to give motion to water, and produce a velocity of as many miles per hour. The Ganges descends but 800 feet in 1,800 miles; its waters require a month to move down this long inclined plane. A fall of three feet per mile will make a mountain torrent.

65. Waves are produced by the friction of the wind against the surface of the water.

66. Pneumatics treats of the general properties and the pressure of gases.

67. The barometer is an instrument for measuring the pressure of the air; it consists, essentially of a tube and cup, of mercury.

68. The barometer is used (1) to indicate the weather, and (2) to measure the height of mountains.

69. There are three, viz.: gravity, which binds it to the earth, and the centrifugal and the repellant [heat] forces, which tend to hurl it off into space. Under the action of the latter forces, the atmosphere, like a great bent spring, is ready to bound away at the first opportunity; but the attraction of the earth holds it firmly in its place.

70. About 50 miles has been taken as the extreme limit of the atmosphere. The latest investigations, however, indicate that there is an extremely rarefied air at the height of perhaps 500 miles.

71. Its density rapidly diminishes as we ascend. At the height of 3½ miles, it is but one-half that at the sea level. At 40 miles the atmosphere is as rare as in the vacuum of an air-pump.

72. In fair weather, the moisture of the air is an invisible vapor mingled with it and adding to its pressure, while in foul weather the vapor is separated in the form of clouds.

73. Because the upward pressure of the air is removed from our feet.

74. Acoustics treats of the doctrine of sound.

75. The term sound is used in two senses—the subjective, that which has reference to our mind; and the objective, that which refers only to the objects around us.

76. Sound is the sensation produced upon the organ of hearing by vibrations in matter. In this use of the word, there can be no sound where there is no ear to catch the vibrations. An oak may fall in the forest, and, if there is no ear to hear it, there is no noise, and the old tree drops quietly to its resting place.

77. Sound is those vibrations of matter capable of producing a sensation upon the organ of hearing. In this use of the word, there can be a sound in the absence of the ear,

An object falls and the vibrations are produced, though there may be no organ of hearing to receive an impression from them.

78. The velocity of sound depends on the elasticity and density of the medium through which it passes.

79. Because the higher the elasticity, the more promptly and rapidly the motion will be transmitted, since the elastic force acts like a bent spring between the molecules. The greater the density, the more molecules to be set in motion, and hence the slower the transmission.

80. Sound travels through the air (at the freezing point) at the rate of 1,090 feet per second. A rise in temperature diminishes the density of the air, and thus sound travels faster in warm and slower in cold air.

81. Sound travels; through water at the rate of 4,700 feet per second. Water is denser than the air, and for that reason sound should travel in it much slower; but its elasticity, which is measured by the force required to compress it, is so much greater that the rate is quadrupled. Sound travels through solids faster than through air; and the velocity in iron is nearly ten times greater.

82. Under ordinary circumstances, sounds travel with the same velocity.

83. When a sound-wave strikes against the surface of another medium, a portion goes on while the rest is reflected. The law which governs reflected sound is that of reflected motion—*the angle of incidence is equal to that of reflection.*

84. The air at night is more homogeneous; consequently, sounds are heard more clearly and farther than in the daytime.

85. It is only that between irregular and regular vibrations. Whatever may be the cause which sets the air in motion, if the vibrations be uniform and rapid enough, the sound is musical. If the ticks of a watch could be made with sufficient rapidity, they would lose their individuality, and blend into a musical tone.

86. If two sounds meet in exactly opposite phases, and the two forces are equal, they will balance each other and silence will ensue. Thus, *a sound added to a sound will produce silence.* In the same way, *two motions may produce rest; two lights may cause darkness; and two heats may produce cold.*

87. Wind instruments produce musical sounds by means of enclosed columns of air. Sound-waves run backward and forward through the tube, and act on the surrounding air like the vibrations of a cord.

88. Optics is that science which treats of light and vision.

89. A luminous body is one that emits or sends forth light.

90. A non-luminous body is one that reflects light, and is visible only in the presence of a luminous body.

91. A medium is any substance through which light passes. A transparent body is one that offers so little obstruction to the passage of light that we can see objects through it.

92. (1) Light passes off from a luminous body equally in every direction. (2) Light travels through a uniform medium in straight lines. (3) The intensity of light decreases as the square of the distance increases.

93. The velocity of light is about 183,000 miles per second. This is so great that, for all distances on the earth, it is instantaneous.

94. A translucent body is one that lets some light pass, but not enough to render objects visible through it. An opaque body is one that does not transmit light.

95. There is supposed to be a fluid termed ether, constituting a kind of universal atmosphere, diffused throughout all space. It is so subtle that it fills the pores of all bodies, eludes all chemical tests, passes in through the glass receiver and remains even in the vacuum of an air-pump.

96. The three kinds are: plane, concave, and convex. The first has a flat surface; the second, one like the inside, and the third, one like the outside of a watch crystal.

97. The general principle of mirrors is that *the image is always seen in the direction of the reflected ray as it enters the eye.*

98. Mirage is an optical delusion whereby pictures of distant objects are seen as if near. On the heated deserts of Africa, the traveler beholds quiet lakes and shadows of trees in their cool waters. Rushing forward to slake his eager thirst, he finds only the barren waste of sand.

99. The cause is found in the reflection and refraction of the rays of light as they traverse layers of air of unequal density.

100. The solar spectrum contains violet, indigo, blue, green, yellow, orange, and red.

101. Diffraction of light is caused by a beam of light passing along the edge of some opaque body. As the waves of ether strike against it, they put in motion another set of waves on the opposite side which interfere with the first system.

102. The rainbow is formed by the refraction and reflection of the sunbeam in drops of falling water.

103. Halos, coronas, sundogs, circles about the moon, the gorgeous tinting at sunrise and sunset, are all produced by the refraction and reflection of the sun's rays when passing through the clouds in the upper regions of the atmosphere. The phenomenon familiarly known as the "sun's drawing water," consists merely of the long shadows of broken clouds.

104. Rays which pass through a lens near the edge are brought to a focus sooner than those near the center; therefore, when an image is clear around the edge, it will be indistinct at the center, and *vice versa*. This wandering of the rays from the focus is termed spherical aberration.

105. Chromatic aberration is caused by the different refrangibility of the several colors which compose white

light. The violet being bent most, tends to come to a focus sooner than the red, which is bent least. This causes the play of colors seen around the image produced by an ordinary glass.

106. It is remedied by using a second lens of different dispersive power, which counteracts the effects of the first.

107. Microscopes are af two kinds—simple and compound. The former consists of a double convex lens; the latter contains at least two lenses.

108. Telescopes are of two kinds—reflecting and refracting. The former contains a large metallic mirror which reflects the rays of light to a focus; the latter, like the microscope, contains an object-lens, which forms an image.

109. The opera-glass contains an object-glass and an eye-piece. The latter is a double concave lens; this increases the visual angle by diverging the rays of light, which would otherwise come to a focus beyond the eye-piece.

110. The camera used by photographers contains a double convex lens which throws an inverted image of the object upon the ground glass screen.

111. It must be one-half the person's height.

112. Because the blow excites the optic nerve, and so produces the sensation of light.

113. Luminous heat is that which radiates from a luminous body. Obscure heat is that from a non-luminous source.

114. A diathermanous body is one which allows the heat to pass through it readily. Cold is a merely relative term, indicating the absence of heat in a greater or less degree.

115. The sources of heat are the sun, stars, mechanical and chemical forces.

116. It cannot. If destroyed in one form it reappears in another without loss.

117. By the addition of heat the molecules are urged into swifter motion, and therefore pushed further apart, in-

creasing the size of the body. Hence the law, "*Heat expands and cold contracts.*"

118. If heat be applied to a liquid, the temperature rises until the boiling point is reached, when it stops. The expansion, however, continues until the motion is so violent as to overcome the cohesive force and to throw off particles of the liquid.

119. When we heat water the bubbles which pass off first contain merely the air dissolved in the liquid; next bubbles of steam form on the bottom and sides of the vessel, and, rising a little distance, are crushed in by the cold water and condensed. In breaking they produce that peculiar sound known as "simmering," and ascend higher and higher as the temperature of the water rises, until at last they break at the surface, and the steam passes off into the air.

120. Because any substance which increases the cohesive power of the water elevates the boiling point.

121. Evaporation should be distinguished from vaporization. It is a slow formation of vapor, which takes place at all ordinary temperatures. It is hastened by an increase of surface and a gentle heat. This principle is made useful in the arts for separating a solid from the liquid which holds it in solution.

122. They are largely employed in condensing milk, in the manufacture of sugar, etc.; and are so arranged that the air above the liquid in the vessel may be exhausted, and then the evaporation takes place very rapidly, and at so low a temperature that all danger of burning is avoided.

123. Absorption and reflection are intimately connected with radiation. A good absorber is also a good radiator, but a good reflector can be neither. Snow is a good reflector but a poor absorber or radiator. Light colors absorb less and reflect more than dark colors. White is the best reflector, and black the best absorber and radiator.

124. On the Desert of Sahara, where "the soil is fire and the wind is flame," the dry air allows the heat to escape

through it so readily that ice is sometimes formed at night. The dryness of the air at great elevations accounts, in part, for the coldness which is there felt so keenly.

125. The steam engine is a machine for using the elastic force of steam as a motive power. There are two classes of engines—the high-pressure and the low-pressure. In the former the steam, after being employed to do its work, is forced out into the air; in the latter it is condensed in a separate chamber by a spray of cold water. As the steam is condensed in the low-pressure engine, a vacuum is formed behind the piston; while the piston of the high-pressure engine acts against the pressure of the air.

126. The governor is an apparatus for regulating the supply of steam. When a machine is going too fast, the balls fly out by centrifugal force and shut off a portion of the steam; when too slowly, they fall back, and, opening the valve, let on the steam again.

127. The fly-wheel, by its inertia, serves to render the movement of the machinery uniform.

128. Dew is formed by the grass at night becoming cooled by radiation, and condenses upon its surface the vapor of the air.

129. Dew will gather most freely upon those objects that are the best radiators, as they will the soonest become cool. Thus grass, leaves, etc., which need the most, get the most.

130. Dew will not form on windy nights, because the air is constantly changing and does not become cool enough to deposit its moisture.

131. It is. Because it shows that the moisture of the air is easily condensed.

132. Because the clouds act like a blanket, to prevent radiation and keep the earth warm.

133. Fogs are formed when the temperature of the air falls below the dew-point (*i. e.*, the temperature at which dew is deposited). They are found mainly on low grounds

and in the vicinity of rivers, ponds, etc., where the abundance of moisture keeps the air constantly saturated.

134. Clouds differ from fogs only in their elevation in the atmosphere. They are formed when a "warm, humid wind penetrates a cold air, or a cold wind a warm, humid air."

135. Mountains are "cloud-capped," because the warm air rising from the valley is condensed upon their cold summits. Clouds are constantly falling by their weight; but, as they melt away in the warm air below, by condensation they increase above.

136. The *nimbus* cloud is a dark-colored cloud from which rain falls. The *stratus* cloud is composed of broad, widely extended cloud-belts, sometimes spread over the whole sky. It is the lowest cloud, and often rests on the earth. It is the night cloud.

137. The *cumulus* cloud is made up of large cloud-masses, looking like snow-capped mountains piled up along the horizon. It forms the summits of pillars of vapor, which, streaming up from the earth, are condensed in the upper air. It is the day cloud; and, when of small size and seen only near midday, is a sign of fair weather.

138. The *cirrus* cloud consists of light, fleecy clouds floating high in air. It is believed to be formed of spiculæ of ice or flakes of snow. The *cirro-cumulus* is formed by small, distinct, rounded portions of the cirrus cloud, which separate from each other, leaving a clear sky between. It accompanies warm, dry weather.

139. The *cirro-stratus* is produced when the cirrus cloud spreads out into long, slender strata. It forebodes storms. The *cumulo-stratus* presents the peculiar forms called "thunder-heads." It is caused by a blending of the cumulus with the stratus, and is a precursor of thunder-storms.

140. Rain is vapor condensed by the sudden cooling of the air in the upper regions. At a low temperature the va-

por is frozen directly into snow. This may melt before it reaches the earth, and fall as rain.

141. Winds are produced by variations in the temperature of the air. The atmosphere at some point is expanded, rises, and colder air flows in to supply its place.

142. The land and sea breezes of tropical islands are caused by the unequal specific heat of land and water. During the day the land becomes more highly heated than the water, and hence toward evening a sea breeze sets in from the ocean. At night the land cools faster than the water, and so, toward morning, a land breeze sets out from the land.

143. Trade-winds are so named because, by their regularity, they favor commerce. The air about the equator is highly heated, and, rising to the upper regions, flows off north and south. The cold air near the poles sets toward the equator to fill its place. If the earth were at rest, this would make an upper warm current flowing from the equator, and a lower cold current flowing toward it. As the earth is revolving on its axis from west to east, the undercurrent starting from the poles is constantly coming to a part moving faster than itself. It therefore lags behind; and, when it reaches the north equatorial regions, it lags so much that it becomes a current from the northeast, and, in the south equatorial regions, a current from the southeast.

144. Oceanic currents are produced in a similar manner. The water, which is heated by the vertical sun of the tropics, rises and flows toward the poles.

145. The Gulf Stream, which issues from the Gulf of Mexico, carries the heat of the Caribbean Sea across the northern Atlantic to the shores of Scotland and Norway. This tropical river, flowing steadily through the cold water of the ocean, rescues England from the snows of Labrador. Should it, by any chance, break through the Isthmus of Panama, Great Britian would be condemned to eternal glaciers.

146. The escaping steam is thrown into vibration by the peculiar shape of the spout.

147. It is caused by the expansion of the air in the cells of the wood.

148. It is the vapor which it contains, reflecting the blue light of the sunbeam.

149. Electricity is that science which unfolds the phenomena and laws of the electric fluid.

150. There are five different forms: (1) Magnetic electricity; (2) frictional or statical electricity; (3) galvanic, voltaic, or dynamic electricity; (4) thermal electricity; (5) animal electricity. These are intimately connected; and each can give rise to the other.

151. Magnetism is that branch of science which treats of the properties of the magnet. A magnet is a term applied to certain specimens of iron ore, which have the property of attracting iron and some of its ores, and, when freely suspended, of pointing to the poles.

152. Magnetic induction is the power a magnet possesses to develop magnetism in iron. If a piece of soft iron be brought near a magnet, it immediately assumes the magnetic state, which, however, it loses on being removed.

153. The compass is a magnetic needle used by mariners, hunters, surveyors, etc. It is very delicately poised over a card, on which the "points of the compass" are marked. The needle does not often point directly north and south. The "*line of no variation*," as it is called, runs in an irregular course through the United States from Cape Lookout across Lake Erie to Hudson's Bay. East of this the variation is toward the west, and west of it it is toward the east.

154. It is; although it shifts thus every hour in the day, and does so only in obedience to the laws which control its action.

155. It does. All iron bars standing vertically possess slight magnetic properties. The upright parts of an iron fence, lightning rods, standards of chairs and desks, etc., on

being tested by the magnetic needle, will be found to possess north polarity in the end next the ground, and south polarity in the other end.

156. Frictional electricity is developed by friction. A person's hair often crackles under a gutta-percha comb; and in cold, frosty weather, one, by shuffling about in his stocking-feet upon the carpet, can develop so much electricity in his body that he can ignite a jet of gas by simply applying his finger to it.

157. The electroscope is an instrument to detect changes in the electric state of bodies.

158. The term *static* is applied to frictional electricity, and *dynamic* to galvanic. The former indicates a force at rest; the latter, one in motion.

159. Of the nature of electricity we know but little. The positive and negative forces exist in every body in a state of equilibrium. When this is disturbed by friction, chemical action, etc., both are set free; and we cannot develop one without the other.

160. It is. The opposite kinds manifest themselves at opposite parts of the surface, as in a magnet, and are therefore called a polar force; while the slightest cause disturbs the electric equilibrium.

161. A body which allows the electric force to pass freely through it is termed a conductor; a body which does not is called a non-conductor or insulator.

162. Copper is one of the best conductors, and is used in all electrical experiments. Glass is one of the best insulators.

163. Electricity can be collected only by means of insulation. It can be developed by rubbing an iron rod, but is lost as fast as formed by passing off through the metal to the hand. A glass rod does not conduct it to the body, so it is retained until it gradually dissipates in the air.

164. The influence of an electrified body over other bodies near it is termed electrical induction.

165. The Leyden jar consists of a glass jar, coated inside and outside, nearly to the top, with tin-foil, which is fitted with a cover of baked wood, through which passes a wire with a knob at the top and below, a chain extending to the inner coating.

166. The jar is charged by bringing the knob near the prime conductor of the electrical machine, while the outer coating communicates freely with the earth, Bright sparks will then leap in rapid succession to the inner coating, while similar ones will pass off from the outer coating.

167. The jar is discharged by holding one knob of the discharger upon the outer coating, and the other upon the knob of the jar. The equilibrium will be restored with a sharp snap and a brilliant flash; while minute particles are detached from the solid conductors, and, burning, give color and brilliancy to the spark.

168. Lightning is only the discharge of a Leyden jar on the grand scale upon which nature performs her operations. Two clouds charged with opposite electricities, and separated by the non-conducting air, approach each other. When the tension becomes sufficient to overcome the resistance, the two forces rush together with a blinding flash and terrific peal. The lightning moves along the line where there is the least resistance, ard so describes a zig-zag course. If we can trace the entire length, we call it chain-lightning; if we only see the flash through intervening clouds, it is sheet-lightning; and if it is the reflection of distant discharges, we term it heat-lightning.

169. The report is caused by the clashing of the atoms of displaced air. The rolling of the thunder is produced by the reflection of the sound from distant clouds. Sometimes the clouds and the earth become charged with opposite electricities, separated by the non-conducting air.

170. The aurora borealis—"northern lights"—is probably caused by the passage of electricity through the rarefied atmosphere of the upper regions.

171. The intimate relation between the aurora and magnetism is shown from the fact that the magnetic needle is disturbed when the aurora is visible, and seems to tremble as the streamers dart to and fro.

172. Lightning-rods are based on the principle that electricity always seeks the best conductor. The rod should be pointed at the top with some metal which will not easily corrode. If constructed in separate parts they should be securely jointed; the lower end should extend into water, or else deep into the damp ground, beyond the possibility of any drought rendering the earth about it a non-conductor, and be packed about with ashes or charcoal. If the rod is of iron, it needs to be much larger than if of copper, which is a better conductor. Every elevated portion of the building should be protected by a separate rod. Chimneys in which fire is constantly kept need especial care, because of the ascending column of vapor and smoke. Water conductors, tin roofs, etc., should be connected with the damp ground or the lightning-rod, that they may aid in conveying off the electricity.

173. The value of a lightning rod consists, most of all, in its power of quietly restoring the equilibrium between the earth and the clouds. By erecting lightning-rods we thus lessen the liabilities of a sudden discharge.

174. It does, both quietly and by sudden discharge.

175. Yes. Providence has provided a harmless conductor in every leaf, spire of grass, and twig. A common blade of grass, pointed by nature's exquisite workmanship, is three times more effectual than the finest cambric needle, and a single pointed twig than the metallic point of the best constructed rod.

176. The duration of the flash has been estimated at one-millionth of a second. Some idea of its instantaneousness can be formed from the fact that the spokes of a wheel revolved so rapidly as to become invisible by daylight can be distinctly seen by a spark from a Leyden jar. Wheat-

stone considered the velocity of lightning through a copper wire to be 288,000 miles per second.

177. Frictional electricity is noisy, sudden, and convulsive; galvanic is silent, constant, and powerful. While one is a quick, violent blow, the other is a steady, uniform pressure. Intensity is the characteristic of the former, quantity of the latter. The lightning will leap through miles of intervening atmosphere, while the galvanic current will follow a conductor around the globe, rather than jump across the gulf of a half inch of air. The most powerful frictional machine would be insufficient for telegraphing; while dispatches have been sent across the ocean with a tiny battery composed of a gun-cap and a strip of zinc, excited by a drop of water the size of a tear.

178. Electrotyping is the process of depositing metals from their solution by means of electricity. It is much used in copying medals, wood-cuts, type, etc. An impression of the object is taken with gutta-percha, or wax; the surface to be copied is brushed over with black-lead to render it a conductor. The mould is then suspended in a solution of sulphate of copper, from the negative pole of the battery; a plate of copper is hung opposite on the positive pole. The electric current decomposes the sulphate of copper; the metal goes to the negative pole and is deposited upon the mould, while the acid, passing to the positive pole, dissolves the copper, and thus preserves the strength of the solution.

179. Electro-plating is the process of coating with silver or gold by electricity. The metal is deposited most readily on German silver, brass, copper, or nickel silver. The last is a mixture of copper, zinc, and nickel, and is used for the best plated-ware. The vessels to be plated are thoroughly cleansed, and then hung in a solution of silver from the negative pole, while a plate of silver is suspended on the positive pole. In about five minutes a mere "blush" of the metal will be deposited, which perfectly conceals the baser metal and is susceptible of a high polish. A vessel is

gold-lined by filling it with a solution of gold, suspending in it a slip of gold from the positive pole of the battery, and then attaching the negative pole to the vessel; while the current passing through the liquid causes it to bubble like soda-water, and in a few moments deposits a thin film of gold over the entire surface.

180. If a current of electricity be passed over a magnetic needle, the needle will turn and tend to place itself at right angles to the wire. If the wire be brought over and beneath the needle, it doubles the effect, and the play of the needle becomes a very delicate test of the presence and direction of the electric force.

181. A galvanometer is an instrument or apparatus for measuring the force, or detecting the presence, of minute quantities of galvanic electricity.

ASTRONOMY.

QUESTIONS.

1. Define Astronomy.
2. What is the difference in the appearance of a fixed star and a planet?
3. What is the milky-way?
4. What can you say of the antiquity of astronomy?
5. How far back do the Chinese records extend?
6. Why should the Chaldeans have become versed in this study?
7. What discoveries did they make?
8. What Grecian philosopher early acquired a reputation in this science?
9. What were his teachings?
10. What memorable eclipse did he predict?
11. What two pupils had Thales under his charge?
12. What did Anaximander teach? Anaxagoras?
13. Who was Pythagoras?
14. What was his characteristic trait?
15. Explain his theory.
16. What theory did Eudoxus advance?
17. What has Hipparchus been styled?

18. How did Egypt rank in science at an early day?

19. What preparation did the Grecian philosophers make to fit themselves for teachers.

20. How long did Pythagoras travel for this purpose?

21. Upon what was the Ptolemaic system founded?

22. Show how the movements of the planets puzzled the ancients.

23. What did the advocates of this theory assume?

24. Did this theory possess any accuracy?

25. Could they adapt it to explain any new motion?

26. State something of the repute in which astrology was held.

27. Tell what you can of the system.

28. Describe the Copernican system.

29. Who was Tycho Brahe?

30. What good did Tycho Brahe accomplish?

31. Who was Kepler?

32. Mention Kepler's three laws.

33. What discoveries did Galileo make?

34. Give an account of his observations on the moon.

35. Give an account of his observations on Jupiter's moons.

36. How were Galileo's discoveries received?

37. Who discovered the law of gravitation? Repeat it.

38. What is the celestial sphere?

39. Why can we not see the stars by day as by night?

40. Name the three systems of circles.

41. Define the rational horizon. Sensible horizon.

42. Define a vertical circle. Prime vertical. Meridian.

43. Define zenith. Nadir. Azimuth. Altitude. Amplitude.

44. Define the equinoxes.

45. Define the ecliptic.

46. Define the poles of the ecliptic.

47. Define the vernal equinox. Autumnal equinox.

48. Define the zodiac.

49. How is the zodiac divided?

50. Of what is the solar system composed?
51. What is the sun's distance from us?
52. To what is the sun's light equal?
53. To how many full moons is the sun's light equal?
54. What proportion of the sun's heat reaches the earth?
55. What is the apparent size of the sun?
56. What is the diameter of the sun? Volume?
57. How large did Pythagoras think the sun is?
58. How can we see the spots on the sun?
59. What were formerly the views of astronomers with regard to the sun's face?
60. When were the spots on the sun discovered?
61. Describe the motion of the spots.
62. How do the spots change in form as they pass across the disk?
63. What does this change in the spots prove?
64. Why do not the spots move in straight lines?
65. Tell the influence of the planets on the spots.
66. Is the sun brighter than the Drummond light?
67. Describe the constitution of the sun according to Wilson's theory.
68. How are the spots produced?
69. What is Kirchoff's theory?
70. What is the cause of the heat of the sun?
71. Will the heat of the sun ever cease?
72. Do the planets revolve upon their axes?
73. Where is the velocity of the planets greatest?
74. Are the planets inhabited?
75. Describe the appearance of Mercury, and where seen.
76. What was the opinion of the ancients in regard to Mercury?
77. What is its distance from the sun?
78. What is the diameter of Mercury? Volume?
79. Describe Venus.
80. When is Venus the brightest?

81. What is the distance of Venus from the sun?

82. What is the velocity of Venus?

83. What is its distance from the earth?

84. When is Venus the brightest?

85. What is the diameter of Venus? Volume? Density?

86. Describe the seasons of Venus?

87. What proof have we of an atmosphere?

88. Has Venus any moon?

89. Describe the earth.

90. What are we to consider the earth to be?

91. Is it probable that the earth was always dark and dull as it now seems to us?

92. What is the form of the earth?

93. Is the equator a perfect circle?

94. What is the circumference of the earth? Density? Weight?

95. Explain the cause of the rising and setting of the sun and stars.

96. What would be the effect if the earth were to stop revolving?

97. Is there any danger of this catastrophe?

98. Describe the path of the earth about the sun.

99. What is the entire circumference of the ecliptic?

100. When we say "the earth is in libra," what do we mean?

101. Why will a top stand while spinning, but fall as soon as it ceases?

102. Show how the rays of the sun strike the various parts of the earth at different angles at the same time.

103. Show how the angles vary at different times.

104. Explain the cause of equal day and night at the equinoxes.

105. Describe the yearly path of the earth about the sun, at the summer solstice.

106. Describe the yearly path of the earth about the sun, at the autumnal equinox.

107. Describe the yearly path of the earth about the sun, at the winter solstice.

108. Describe the yearly path of the earth about the sun, at the vernal equinox.

109. How much nearer are we to the sun in the winter?

110. When do the extremes of heat and cold occur?

111. Why is summer longer than winter?

112. Does the earth move with the same velocity in all parts of its orbit?

113. Describe the results if the axis of the earth were perpendicular to the ecliptic.

114. Describe the results if the equator were perpendicular to the ecliptic.

115. How far does the atmosphere extend above the earth?

116. Why do the sun and moon appear flattened when near the horizon?

117. What causes the hazy appearance of the heavenly bodies near the horizon?

118. What is the cause of twilight?

119. What is diffused light?

120. Is there really any sky in the heavens?

121. What is the mean distance of the moon from the earth?

122. What is the real path of the moon?

123. What is the moon's diameter?

124. Why does it appear larger than it really is?

125. Does the center of gravity in the moon coincide with that of magnitude?

126. Has the moon any atmosphere?

127. What proof have we of this?

128. Describe the path of the moon around the earth.

129. What is harvest moon?

130. What is hunter's moon?

131. Define the cause of this phenomenon.

132. What is an occultation?

133. Describe the telescopic appearance of the moon.

134. When can an eclipse of the sun occur?
135. What curious phenomena attend a total eclipse?
136. What curious custom prevails among the Hindoos?
137. Explain the cause of tides.
138. Define Mars.
139. What is its distance from the sun?
140. What is its velocity?
141. What is its diameter? Volume?
142. Has Mars any atmosphere? Moon?
143. Can we watch the change of its seasons?
144. Describe Jupiter.
145. What is its distance from the sun? Velocity?
146. What is its distance from the earth?
147. What is its diameter? Volume?
148. Describe the seasons of Jupiter.
149. Are Jupiter's moons visible to the naked eye?
150. How was the velocity of light discovered?
151. What is the velocity of light?
152. Describe Saturn.
153. What is its distance from the sun?
154. What is its distance from the earth?
155. What is its diameter? Volume? Density?
156. Describe its seasons.
157. Describe Uranus.
158. What is its distance from the sun? What is its year?
159. What is its diameter? Density?
160. Describe its seasons.
161. Describe its telescopic features.
162. Describe the peculiarity of its moons.
163. Describe Neptune.
164. What is its distance from the sun? Year? Velocity?
165. What is its diameter? Volume? Density?
166. Do we know anything of its seasons?
167. What are the telescopic features?
168. Has Neptune any moon?
169. Define an ærolite. A shooting-star. A meteor.

170. What is the average number of meteors and shooting-stars daily?

171. Define the term comet.

172. Where do comets appear, and in what direction do they move?

173. How does a comet look when first seen?

174. Do comets shine by their own or by reflected light?

175. Do we ever see the stars?

176. What is a sidereal day?

177. How is the exact interval of time found?

178. How is the sidereal day divided?

179. What is a solar day?

180. What causes the difference between a sidereal and a solar day?

181. What is the civil day?

ASTRONOMY.

ANSWERS.

1. Astronomy is the science which teaches the knowledge of the celestial bodies their magnitudes, motions, distances, periods of revolution, eclipses, order, and of the causes of their various phenomena. This science depends on observations made chiefly with instruments, and upon mathematical calculations.

2. Those stars which shine with a clear, distinct light, and change their position with respect to the others, are called planets. Those which remain immovable, and shine with a shifting, twinkling light, are termed fixed stars; although it is now known that they also are in motion.

3. The milky-way is a whitish, vapory belt, and is composed of multitudes of millions of suns — of which our own sun itself is one — so far removed from us that their light mingles, and makes only a fleecy whiteness.

4. Astronomy is the most ancient of all sciences. The study of the stars is, without doubt, as old as man himself, and hence many of its discoveries date back of authentic records, amid the dim mysteries of tradition.

5. The Chinese possess an account of a conjunction of four planets and the moon, which must have occurred a century before the flood. They have also the first record of an eclipse of the sun, which took place about 220 years after the deluge. It is said that one of their kings, 2,000 years before Christ, put to death the principal officers of state because they had failed to calculate an approaching eclipse.

6. Because the Chaldean shepherds, watching their flocks by night under the open sky, could not fail to become familiar with many of the movements of the heavenly bodies.

7. The Chaldeans invented the sun-dial, and also discovered the "Saros," or "Chaldean Period," which is the length of time in which the eclipses of the sun and moon repeat themselves in the same order.

8. Mr. Thales, who was noted for his electrical discoveries, and acquired much renown; he established the first school of astronomy in Greece.

9. Mr. Thales taught that the earth is round, and that the moon receives her light from the sun. He also introduced the division of the earth's surface into zones, and the theory of the obliquity of the ecliptic.

10. He predicted an eclipse of the sun, which is memorable in ancient history as having terminated a war between the Medes and Lydians. These nations were engaged in a fierce battle, but the awe produced by the darkening of the sun was so great, that both sides threw down their arms and made peace.

11. Anaximander and Anaxagoras.

12. Anaximander taught that the stars are suns, and that the planets are inhabited. Anaxagoras maintained that there is but one God, that the sun is solid, and as large as the country of Greece, and attempted to explain eclipses and other celestial phenomena by natural causes. For his audacity and impiety, as his countrymen considered it, he and his family were doomed to perpetual banishment.

13. Pythagoras founded the second celebrated astronomical school at Crotona, at which were educated hundreds of enthusiastic pupils. He knew the causes of eclipses, and calculated them by means of the Saros.

14. Pythagoras was most emphatically a dreamer. He conceived a system of the universe in many respects correct; yet he advanced no proof, and made few converts to his views, and they were soon well-nigh forgotten.

15. He held that the sun is the center of the solar system, and that the planets revolve about it in circular orbits; that the earth revolves daily on its axis, and yearly around the sun; that Venus is both morning and evening star; that the planets are inhabited—and he even attempted to calculate the size of some of the animals in the moon; that the planets are placed at intervals corresponding to the scale in music, and that they move in harmony, making the "music of the spheres," but that this celestial concert is heard only by the gods—the ears of man being too gross for such divine melody.

16. Eudoxus held that the heavenly bodies are set, like gems, in hollow, transparent, crystal globes, which are so pure that they do not obstruct our view, while they all revolve around the earth.

17. Hipparchus, who flourished in the second century B. C., has been called the "Newton of Antiquity." He was the most celebrated of the Greek astronomers; he calculated the length of the year within six minutes, discovered the precession of the equinoxes, and made the first catalogue of the stars—1,081 in number.

18. Egypt, as well as Chaldea, was noted for its knowledge of the sciences long before they were cultivated in Greece.

19. It was their practice, before aspiring to the rank of teacher, to travel for years through these countries, and gather wisdom at its fountain-head.

20. He spent thirty years in traveling. In about 200 years after Pythagoras, the celebrated school of Alexandria

was established. Here were concentrated in vast libraries and princely halls nearly all the wisdom and learning of the world; here flourished all the sciences and arts, under the patronage of generous kings.

21. It was founded largely upon the materials gathered by previous astronomers, such as Hipparchus, whom we have already mentioned, and Eratosthenes, who computed the size of the earth by means even now considered the best —the measurement of an arc of the meridian.

22. The movements of the planets were to the ancients extremely complex. Venus, for instance, was sometimes seen as "evening star" in the west; and then again as "morning star" in the east. Sometimes she seemed to be moving in the same direction as the sun, then, going apparently behind the sun, appeared to pass on again in a course directly opposite. At one time she would recede from the sun more and more slowly and coyly, until she would appear to be entirely stationary; then she would retrace her steps, and seem to meet the sun. All these facts were attempted to be accounted for by an incongruous system of "cycles and epicycles," as it is called.

23. They assumed that every planet revolves in a circle, and that the earth is the fixed center around which the sun and the heavenly bodies move. They then conceived that a bar, or something equivalent, is connected at one end with the earth; that at some part of this bar the sun is attached; while between that and the earth, Venus is fastened, not to the bar directly, but to a sort of crank; and farther on, Mercury is hitched on in the same way. They did not fully understand the nature of these bars—whether they were real or only imaginary—but they *did* comprehend their action, as they thought; and so they supposed the bar revolved, carrying the sun and planets along in a large circle about the earth; while all the short cranks kept flying around, thus sweeping each planet through a smaller circle.

24. It did not. By it we can see that the planets would sometimes go in front of the sun and sometimes behind;

and their places were so accurately predicted, that the error could not be detected by the rude instruments then in use.

25. No; for as soon as a new motion of one of the heavenly bodies was discovered, a new crank, and of course a new circle, was added to account for the fact.

26. Astrology was ranked as one of the most important branches of knowledge for the physician. Star-diviners were held in the greatest estimation. The system continued to increase in credit until the middle ages, when it was at its height of popularity. The issue of any important undertaking, or the fortunes of an individual, were foretold by the astrologers, who drew up a horoscope, representing the position of the stars and planets at the beginning of the enterprise, or at the birth of the person.

27. The system was a complete and complicated one, and contained regular rules, which guided the interpretation, and which were so abstruse that they required years for their entire mastery. Venus, foretold love; Mars, war; the Pleiades, storms at sea. The ignorant were not alone the dupes of this visionary system. Lord Bacon believed in it most firmly.

28. About the middle of the sixteenth century, Copernicus, breaking away from the theory of Ptolemy, which was still taught in all the institutions of learning in Europe, revived the theory of Pythagoras. He saw how beautifully simple is the idea of considering the sun the grand center about which revolve the earth and all the planets. He noticed how constantly, when we are riding swiftly, we forget our motion, and think that the trees and fences are gliding by us in the contrary direction. He applied this thought to the movements of the heavenly bodies, and maintained that, instead of all the starry hosts revolving about the earth once in twenty-four hours, the earth simply turns on its own axis; that this produces the apparent daily revolution of the sun and stars; while the yearly motion of the earth about the sun, transferred in the same manner to that body, would account for its various movements.

29. Tycho Brahe was a celebrated Danish astronomer, and propounded a modification of the Copernican system. He rejected the idea of cycles and epicycles; but, influenced by certain passages of scripture, maintained, with Ptolemy, that the earth is the center, and that all the heavenly bodies revolve about it daily in circular orbit.

30. He erected a magnificent observatory, and made many beautiful and rare instruments. His unwearied industry and zeal resulted in the accumulation of a vast fund of astronomical knowledge, which, however, he lacked the wit to apply to any further advance in science.

31. Kepler was a pupil of Tycho Brahe. He adopted the Copernican theory, that the sun is the center of the system.

32. His first law was: *Planets revolve in ellipses, with the sun at one focus.* Second. *A line connecting the center of the earth with the center of the sun passes over equal spaces in equal times.* Third. *The squares of the times of revolution of the planets about the sun are proportional to the cubes of their mean distances from the sun.*

33. Galileo discovered the laws of the pendulum, and of falling bodies. He, however, was educated in and believed the Ptolemaic theory. Galileo had learned that a dutch watchmaker had invented a contrivance for making distant objects appear near. With his profound knowledge of optics and philosophical instruments, he instantly caught the idea, and soon had a telescope completed that would magnify thirty times.

34. Galileo, in examining the moon, discovered its mountains and valleys, and watched the dense shadows sweep over its plains.

35. Near Jupiter, Galileo saw three bright stars, as he considered them, which were invisible to the naked eye. Shortly after, he noticed those stars had changed their relative positions. Being somewhat perplexed, he waited three days for a fair night in which to resume his observations. The fourth night was favorable, and he again found the

three stars had shifted. After continued observations he discovered a fourth star, and finally found that they were all rapidly revolving around Jupiter, each in its elliptical orbit, with its own rate of motion, and all accompanying the planet in its journey around the sun. Here was a miniature Copernican system, hung up in the sky for all to see and examine for themselves.

36. Galileo met with the most bitter opposition. A great many refused to look through the telescope, lest they might become victims of the philosopher's magic. Some prated of the wickedness of digging out valleys in the fair face of the moon; while others doggedly clung to the theory they had held from their youth up.

37. The law of gravitation was discovered by Newton. *Every particle of matter in the universe attracts every other particle of matter with a force directly proportional to its quantity of matter, and decreasing as the square of the distance increases.*

38. The blue arch of the sky, as it appears to be spread above us, is termed the celestial sphere.

39. In the daytime we cannot see the stars because of the superior light of the sun; but with a telescope they can be traced, and an astronomer will find certain stars as well at noon as at midnight. And, when looking at the sky from the bottom of a deep well or lofty chimney, if a bright star happens to be directly overhead, it can be seen with the naked eye, even at midday.

40. The three systems of circles are: the horizon, the equinoctial, and the ecliptic. Each of these has (1) its principal circle, (2) its subordinate circles, (3) its points, and (4) its measurements.

41. The rational horizon is the great circle passing through the center of the earth, separating the visible from the invisible heavens. The sensible horizon is the small circle where the earth and sky seem to meet. It is parallel to the rational horizon, but distant from it the semi-diameter of the earth. No two places have the same sensible hori-

zon; any two on opposite sides of the earth have the same rational horizon.

42. A vertical circle is one passing through the poles of the horizon (the zenith and nadir). The prime vertical is a vertical circle passing through the east and west points. The meridian is a vertical circle passing through the north and south points.

43. Zenith is the point directly overhead. Nadir the one directly under foot. Azimuth is the distance from the meridian, measured east or west, on the horizon (to a vertical circle passing through the object). Altitude is the distance from the horizon, measured on a vertical circle, towards the zenith. Amplitude is the distance from the prime vertical, measured on the horizon, north or south.

44. The equinoxes are the points where the equinoctial and the ecliptic (the sun's apparent path through the heavens) intersect.

45. The ecliptic is the earth's orbit about the sun, or the apparent path of the sun in the heavens. It is inclined to the equinoctial 23° 28′, which measures the inclination of the earth's equator to its orbit, and is called the obliquity of the ecliptic.

46. The poles of the ecliptic are the points where the axis of the earth's orbit meets the celestial sphere.

47. The vernal equinox is the place where the sun crosses the equinoctial, commonly called "crossing the line," in going north, which occurs about the 21st of March. The autumnal equinox is the place where the sun crosses the equinoctial in going south, which occurs about the 21st of September.

48. The zodiac is a belt of the celestial sphere, 8° on each side of the ecliptic. This is of very high antiquity, having been in use among the ancient Hindoos and Egyptians.

49. The zodiac is divided into twelve equal parts — of 30° each — called signs, to each of which a fanciful name is given.

50. The solar system consists of: (1) The sun — the center; (2) the major planets—Vulcan (undetermined), Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, Neptune; (3) the minor planets, at present 140 in number; (4) the satellites, or moons, 18 in number, which revolve around the different planets; (5) meteors and shooting-stars; (6) nine comets whose orbits have been computed, and over 200 of which but little is known; (7) the zodiacal light.

51. The average distance of the sun from the earth is about 91,500,000 miles.

52. The light of the sun is equal to 5,563 wax candles held at a distance of one foot from the eye.

53. It would require 800,000 full moons to produce a day as brilliant as one of cloudless sunshine.

54. The amount of heat we receive annually is sufficient to melt a layer of ice thirty-eight yards in thickness, extending over the whole earth.

55. The sun appears to be about half a degree in diameter, so that 360 disks like the sun, laid side by side, would make a half circle of the celestial sphere. It seems a little larger to us in winter than in summer, as we are 3,000,000 miles nearer it.

56. The sun's diameter is about 850,000 miles. Its volume is 1,245,000 times that of the earth—that is, it would take 1,245,000 earths to make a globe the size of the sun.

57. Pythagoras, whose theory of the universe was, in so many respects, very like the one we receive, believed the sun to be 44,000 miles from the earth, and 75 miles in diameter.

58. We may sometimes examine the sun at early morning, or late in the afternoon, with the naked eye, and at midday by using a smoked glass. The disk will appear to us perfectly distinct and circular, and with no spot to dim its brightness. Should we, however, use a telescope of moderate power, taking the precaution to properly shield the eye with a colored eye-piece, we shall find its surface sprinkled with irregular spots.

59. The natural purity of the sun seems to have been formerly an article of faith among astronomers, and, therefore, on no account to be called in question. Scheiner, it is said, having reported to his superior that he had seen spots on the sun's face, was abruptly dismissed with these remarks: "I have read Aristotle's writings from end to end many times, and, I assure you, I do not find anything in them similar to that which you mention."

60. The spots on the sun appear to have been noticed as early as 807 A. D., although the telescope was not invented until 1610, and Galileo discovered the solar spots in the following year.

61. The spots on the sun change from day to day; but they all have a common movement. About fourteen days are required for a spot to pass across the disk of the sun from the eastern side or *limb* to the western; in fourteen days it reappears, changed in form, perhaps, but generally recognizable.

62. A spot is at first seen on the eastern limb; day by day it progresses with a gradually increasing rapidity until it reaches the center; it now gradually loses its rapidity, and finally disappears on the western limb. Suppose at first it is of an oval shape; as it approaches the center it apparently widens and becomes circular. Having passed that point, it becomes more and more oval until it disappears.

63. It proves the sun's rotation on its axis.

64. This can be explained only on the supposition that the sun's axis is inclined to the ecliptic (7° $15'$).

65. The spots are influenced by the planets. They appear to be especially sensitive to the approach of Venus, on account of its nearness, and of Jupiter, because of its size. The area of the spots exposed to view from the earth is uniformally greatest when Venus is on the opposite side of the sun from us, and least when on the same side. When both Venus and Jupiter are on the side of the sun opposite to us, the spots are much larger than when Venus alone is in that position.

66. Yes. The sun gives out as much light as 146 lime-lights would do, if each were as large as the sun and were burning all over.

67. Wilson's theory supposes that the sun is composed of a solid, dark globe, surrounded by three atmospheres. The first, nearest the black body of the sun, is a dense, cloudy covering, possessing high reflecting power. The second is called the photosphere. It consists of an incandescent gas, and is the seat of the light and heat of the sun. The third, or outer one, is transparent, very much like our atmosphere.

68. The spots are simply openings in these atmospheres made by powerful upward currents. At the bottom of these chasms we see the dark sun as a nucleus at the center, and around this the cloudy atmosphere—the penumbra.

69. Kirchoff's view differs essentially from that of Wilson. It considers the sun as an intensely white-hot solid or fluid body, surrounded by a dense atmosphere of flame, filled with substances volatilized by the vivid heat.

70. The cause is not understood; numerous theories have been advanced, but none have been generally adopted. Some have supposed the heat is produced by condensation, whereby the size of the sun is being constantly decreased.

71. There are many that suppose the heat of the sun is gradually diminishing; but of this we may be assured, there is enough to support life on our globe for millions of years yet to come.

72. The planets revolve upon their axis in the same way as the earth. This we know by telescopic observation to be the case with many planets, and by analogy the rule may be extended to all.

73. Conformably to the principles of gravitation, their velocity is greatest at those parts of their orbit which are nearest the sun, and least at the parts which are most distant from it; in other words, they move quickest in perihelion, and slowest in aphelion.

74. This question cannot be satisfactorily answered. There are many who think that the only object God can possibly have in making any world is to form an abode for man. Our own earth was evidently fitted up, although perhaps not created, for this express purpose. When we turn to the planets, we do not know but God has other races of intelligent beings who inhabit them, or even entirely different ends to attain. Of this, however, we are fully assured, that, if inhabited, the conditions on which life is supported vary much from those familiar to us.

75. Mercury is nearest to the sun of any of the definitely known planets. When the sky is very clear, we may sometimes see it, just after the setting of the sun, as a bright, sparkling star near the western horizon. Its elevation increases evening by evening, but never exceeds 30°. And if we watch it closely, we shall find that it again approaches the sun and becomes lost in his rays. Some days afterwards, just before sunrise, we can see the same star in the east, rising higher each morning, until its greatest elevation equals that which it before attained in the west. Mercury has no moon.

76. The ancients failed to discover the identity of the two stars, and called the morning star Apollo, the god of day; and the evening star, Mercury, the god of thieves, who walked to and fro in the night-time seeking plunder.

77. Mercury revolves about the sun at a mean distance of 35,000,000 miles. Its orbit is the most eccentric of any of the eight principal planets, so that although when in perihelion it approaches to within 28,000,000 miles, in aphelion it speeds away 15,000,000 miles farther, or to the distance of 43,000,000 miles. Being so near the sun, its motion in its orbit is correspondingly rapid, viz.: 30 miles per second.

78. The diameter of Mercury is about 3,000 miles. Its volume is about $\frac{1}{20}$ that of the earth—*i. e.*, it would require twenty globes as large as Mercury to make one the size of the earth, or 25,000,000 to equal the sun.

79. Venus, the next in order to Mercury, is the most brilliant of all the planets. When visible before sunrise, she was called by the ancients Phosphorus, Lucifer, or the morning star, and when she shone in the evening after sunset, Hesperus, Vesper, or the evening star. She presents the same appearance as Mercury.

80. She is the most brilliant about five weeks before and after inferior conjunction, at which time the planet is bright enough to cast a shadow at night. If, in addition, at this time of greatest brilliancy, Venus is at or near her highest north latitude, she may be seen with the naked eye in full daylight.

81. Her mean distance from the sun is about 66,000,000 miles, which varies at aphelion and perihelion within the limits of a half million miles against 15,000,000 miles in the case of the former planet.

82. She makes a complete revolution around the sun in about 225 days, at the mean rate of 22 miles per second; hence her year is equal to about seven and one-half of our months.

83. The distance of Venus from the earth, like that of Mercury, when in inferior conjunction, is the difference between the distances of these two planets from the sun, and when in superior conjunction the sum of these distances.

84. It would be natural to think that the planet is the brightest when the nearest, and thus the largest, but we should remember that then the bright side is toward the sun, and the unillumined side toward us.

85. Venus is about 7,500 miles in diameter. The volume of the planet is about four-fifths that of the earth, while the density is about the same.

86. As the axis of Venus is very much inclined from a perpendicular, its seasons are similar to those of Mercury. The torrid and temperate zones overlap each other; the polar regions having alternately at one solstice a torrid temperature, and at the other a prolonged arctic cold. The inequality of the nights is very marked. The heat and light

are double that of the earth, while the circular form of its orbit gives nearly an equal length to its four seasons.

87. The evidence of an atmosphere, as well as of mountains, rests very much upon the peculiar appearance attending its crescent shape. (1) The luminous part does not end abruptly; on the contrary, its light diminishes gradually, which diminution may be entirely explained by the twilight on the planet. The existence of an atmosphere which diffuses the rays of light into regions where the sun has already set, has hence been inferred. Thus, on Venus, the evenings, like ours, are lighted by twilight, and the mornings by dawn. (2) The edge of the enlightened portion of the planet is uneven and irregular. This appearance is doubtless the effect of shadows cast by mountains.

88. Venus is not known to have any moon.

89. The earth is the next planet we meet in passing outward from the sun. To the beginner, it seems rather strange to class our world among the heavenly bodies; as *they* are brilliant, while *it* is dark and opaque; they appear light and airy, while it is solid and firm; we see in it no motion, while they are constantly changing their position; they seem mere points in the sky, while it is vast and extended. The earth has one moon.

90. At the beginning we are to consider the earth as a planet shining brightly in the heavens, and appearing to other worlds as a star does to us; we are to learn that it is in motion, flying through its orbit with inconceivable velocity; that it is not fixed, but hanging in space, held by an invisible power of gravitation which it cannot evade; that it is small and insignificant beside the mighty globes that so gently shine upon us in the far-off sky; that our earth is only one atom in a universe of worlds, all firm and solid, and equally well fitted to be the abode of life.

91. Probably not. The earth was doubtless once a glowing star, like the sun. Its crust is only the ashes and cinders of that fearful conflagration. The rocks are all burnt bodies. The atmosphere is only the gas left over

after the fuel was all consumed. Every organic object has been rescued by planets and the sunbeam from the grasp of oxygen.

92. The earth is not "round like a ball," but flattened at the poles. Its form is that of an oblate spheroid. Its polar diameter is about 7,899 miles, and its equatorial about 7,925½. The compression is, therefore, about 26½ miles.

93. It has been recently shown that the equator itself is not a perfect circle, but is somewhat flattened, since the diameter which pierces the meridian 14° east of Greenwich is two miles longer than the one at right angles to it.

94. The circumference of the earth is about 25,000 miles. Its density is about 5½ times that of water. Its weight is over six sextillion tons.

95. The earth, in constantly turning from west to east, elevates our horizon above the stars on the west, and depresses it below the stars on the east. As the horizon appears to us to be stationary, we assign the motion to the stars, thinking those on the west, which it passes over and hides, to have sunk below it or set; and imagining those on the east it has dropped below, to have moved above it or risen. So, also, the horizon is depressed below the sun, and we call it sunrise; it is elevated above the sun, and we call it sunset. By this we can see that the diurnal movement of the sun by day, and stars by night, is a mere optical delusion—that here, as elsewhere, we simply transfer motion.

96. The shock would, without doubt, destroy the entire race of man; and we, with houses, trees, rocks, and even the oceans, in one confused mass, would be hurled headlong into space. On the other hand, were the rate of rotation to increase, the length of the day would be proportionately shortened, and the weight of all bodies decreased by the centrifugal force thus produced.

97. Against such a catastrophe we are assured by the immutability of God's laws. The earth has not varied in its revolution the $\frac{1}{100}$ of a second in 2,000 years.

98. The earth revolves in an elliptical path about the sun at a mean distance of $91\frac{1}{2}$ millions of miles. This path is called the ecliptic. Its eccentricity, which is greater than that of the orbit of Venus, changes about $\frac{4}{1000}$ per century, so that, in time, the orbit would become circular, were it not that, after the lapse of some thousands of years, the eccentricity will begin to increase again, and will thus vary through all ages, within definite, although yet undetermined, limits.

99. Its entire circumference is nearly 600,000,000 miles, and the earth pursues this wonderful journey at the rate of 18 miles per second.

100. We mean that a spectator placed at the sun would see the earth in that part of the heavens which is occupied by the sign of Libra.

101. As long as a top spins there is no danger of its falling, since its tendency to preserve parallel its axis of rotation is greater than the attraction of the earth.

102. When the earth is in Libra, and also when in Aries, the rays strike vertically at the equator, and more and more obliquely in the northern and southern hemispheres as the distance from the equator increases, until at the poles they strike almost horizontally. This variation in the direction of the rays produces a corresponding variation in the intensity of the sun's heat and light at different places, and accounts for the difference between the torrid and polar regions.

103. As the earth changes its position, the angle at which the rays strike any portion is varied. For instance, take the earth as it enters Capricornus, and the sun in Cancer: He is now overhead $23\frac{1}{2}°$ *north* of the equator. His rays strike less obliquely in the northern hemisphere than when the earth was in Libra. Let six months elapse: The earth is now in Cancer, and the sun in Capricornus; and he is overhead $23\frac{1}{2}°$ *south* of the equator. His rays strike less obliquely in the southern hemisphere than before, but in the northern hemisphere more obliquely. These six months have

changed the direction of the sun's rays on every part of the earth's surface. This accounts for the difference in temperature between summer and winter.

104. At the equinoxes one-half of each hemisphere is illuminated; hence the name equinox (*æquus*, equal, and *nox*, night). At these points of the orbit the days and nights are equal over the entire earth, each being twelve hours in length.

105. When the earth is at the summer solstice, about the 21st of June, the sun is overhead $23\frac{1}{2}°$ north of the equator, and if its vertical rays could leave a golden line on the surface of the earth as it revolves, they would mark the Tropic of Cancer. The sun is at its furthest northern declination, ascends the highest it is ever seen above our horizon, and rises and sets $23\frac{1}{2}°$ north of the east and west points. It seems now to stand still in its northern and southern course; and hence the name solstice (*sol*, the sun, *sto*, to stand). The days in the north temperate zone are longer than the nights. It is our summer, and the 21st of June is the longest day of the year. In the south temperate zone it is winter, and the shortest day of the year. The circle that separates day from night extends $23\frac{1}{2}°$ beyond the north pole; and if the sun's rays could in like manner leave a golden line on that day, they would trace on the earth the Arctic Circle. It is the noon of the long six-months polar day. The reverse is true at the Antarctic Circle, and it is there the midnight of the long six-months polar night.

106. The earth crosses the aphelion point the 1st of July, when it is at its furthest distance from the sun, which is then said to be in *apogee*. The sun, each day rising and setting a trifle further toward the south, passes through a lower circuit in the heavens. We reach the autumnal equinox the 22nd of September. The sun being now on the equinoctial, if its vertical rays could leave a line of golden light, they would mark on the earth the circle of the equator. It is autumn in the north temperate zone, and spring in the south temperate zone. The days and nights are equal

over the whole earth, the sun rising at 6 A. M., and setting at 6 P. M., exactly in the east and west where the equinoctial intersects the horizon.

107. The sun, after passing the equinoctial — "crossing the line," as it is called — sinks lower toward the southern horizon each day. We reach the winter solstice the 21st of December. The sun is now directly overhead $23\frac{1}{2}^\circ$ south of the equator; and if its rays could leave a line of golden light, they would mark on the earth's surface the Tropic of Capricorn. It is at its furthest southern declination, and rises and sets $23\frac{1}{2}^\circ$ south of the east and west points. It is our winter, and the 21st of December is the shortest day of the year. In the south temperate zone it is summer, and the longest day of the year. The circle that separates day from night extends $23\frac{1}{2}^\circ$ beyond the south pole; and if the sun's rays in like manner could leave a line of golden light, they would mark the Antarctic Circle. It is there the noon of the long six-months polar day. At the Arctic Circle the reverse is true; the rays fall $23\frac{1}{2}^\circ$ short of the north pole, and it is there the midnight of the long six-months polar night. Here, again, the sun appears to us to stand still a day or two before retracing its course, and it is therefore called the winter solstice.

108. The earth reaches its perihelion about the 31st of December. It is then nearest the sun, which is, therefore, said to be in *perigee*. The sun rises and sets each day further and further north, and climbs up higher in the heavens at midday. Our days gradually increase in length, and our nights shorten in the same proportion. On the 21st of March the sun reaches the equinoctial, at the vernal equinox. He is overhead at the equator, and the days and nights are again equal. It is our spring, but in the south temperate zone it is autumn.

109. We are nearer the sun by 3,000,000 miles in winter than in summer. The obliqueness with which the rays strike the north temperate zone at that time prevents our

receiving any special benefit from this favorable position of the earth.

110. We notice that we do not have our greatest heat at the time of the summer solstice, nor our greatest cold at the winter solstice. After the 21st of June, the earth, already warmed by the genial spring days, continues to receive more heat from the sun by day than it radiates by night; thus its temperature still increases. On the other hand, after the 21st of December, the earth continues to become colder, because it loses more heat during the night than it receives during the day.

111. As the sun is not in the center of the earth's orbit, but at one of its foci, that portion of the orbit which the earth passes through in going from the vernal to the autumnal equinox comprises more than one-half the entire ecliptic. On this account the summer is longer than the winter.

112. No. The velocity of the earth varies in different portions of its orbit. When passing from the vernal equinox to aphelion, the attraction of the sun tends to check its speed; from that point to the autumnal equinox, the attraction is partly in the direction of its motion, and so increases its velocity.

113. The sun would then always appear to move through the equinoctial. He would rise and set every day at the same points on the horizon, and pass through the same circle in the heavens, while the days and nights would be equal the year round. There would be near the equator a fierce torrid heat, while north and south the climate would melt away into temperate spring, and, lastly, into the rigors of a perpetual winter.

114. Were this the case, to a spectator at the equator, as the earth leaves the vernal equinox, the sun would each day pass through a smaller circle, until at the summer solstice he would reach the north pole, when he would halt for a time, and then slowly return in an inverse manner. In our own latitude, the sun would make his diurnal revolutions in the way we have just described, his rays shining past the north

pole further and further, until we were included in the region of perpetual day, when we would seem to wind in a spiral course up to the north pole, and then return in a descending curve to the equator.

115. The atmosphere extends above the earth about 500 miles.

116. Because the rays from the lower edge pass through a denser layer of the atmosphere, and are, therefore, refracted about 4′ more than those from the upper edge; the effect of this is to make the vertical diameter appear about 4′ less than the horizontal, and so distort the figure of the disk into an oval shape.

117. The dim and hazy appearance of the heavenly bodies when near the horizon is caused not only by the rays of light having to pass through a larger space in the atmosphere, but also by their traversing the lower and denser part. The intensity of the solar light is so greatly diminished by passing through the lower strata, that we are enabled to look upon the sun at that time without being dazzled by his brilliant beams.

118. The glow of light after sunset and before sunrise, which we term twilight, is caused by the refraction and reflection of the sun's rays by the atmosphere.

119. The diffused light of day is produced in the same manner as that of twilight. The atmosphere reflects and scatters the sunlight in every direction. Were it not for this, no object would be visible to us out of direct sunshine; every shadow of a passing cloud would be pitchy darkness; the stars would be visible all day; no window would admit light except as the sun shone directly through it, and a man would require a lantern to go around his house at noon.

120. No. The blue light reflected to our eyes from the atmosphere above us, or more probably from the vapor in the air, produces the optical delusion we call the sky. Were it not for this, every time we cast our eyes upward we should feel like one gazing over a dizzy precipice; while now the crystal dome of blue smiles down upon us so lov-

ingly and beautifully that we call it heaven.

121. The mean distance is about 238,000 miles. It would require a chain of thirty globes equal in size to the earth to reach the moon. An express train would take about a year to accomplish the journey.

122. The real path of the moon is the result of its own proper motion and onward movement of the earth. The two combined produce a wave-like curve that crosses the earth's path twice each month; this, owing to its small diameter compared with that of the ecliptic, is always concave toward the sun. As the moon constantly keeps the same side turned toward us, it follows that it must turn on its axis once each month.

123. The moon's diameter is about 2,160 miles. It would require fifty globes the size of the moon to equal the earth. Its apparent size varies with its distance; the mean is, however, about one-half a degree, the same as that of the sun.

124. The moon always appears larger than it really is, on account of its brightness.

125. It is thought that the center of gravity of the moon is not exactly at its center of magnitude, but nearly thirty-three miles beyond, and that the lighter half is toward us. If that be true, this side is equivalent to a mountain of that enormous height. We can easily see that if water and air exist upon the moon, they cannot remain on this hemisphere, but must be confined to the side which is forever hidden from our view.

126. The existence of an atmosphere upon our satellite is at present an open question. If there be any, it must be extremely rarefied, perhaps as much so as that which is found in the vacuum obtained in the receiver of our best air-pumps.

127. (1) We see but slight, if any, appearance of twilight in the moon. (2) When the moon passes between us and a star, it does not refract the light of the star, so that

the atmosphere cannot be sufficient to support more than $\frac{3}{100}$ of an inch of the mercurial column.

128. We see it (1) as a delicate crescent in the west just after sunset, as it first emerges from the sun's rays at conjunction. It soon sets below the horizon. Half of its surface is illumined, but only a slender edge with its horns turned from the sun is visible to us. Each night the crescent broadens, the moon recedes about 13° further from the sun, and sets correspondingly later, until at quadrature half of the enlightened hemisphere is turned toward us, and the moon is said to be in her first quarter. Continuing her eastern progress round the earth, the moon (2) becomes gibbous in form, and, about the fifteenth day from new moon, reaches the point in the heavens directly opposite to that which the sun occupies. She is then in opposition, the whole of the illumined side is turned toward us, and we have a full moon. She is on the meridian at midnight, and so rises in the east as the sun sets in the west, and *vice versa*. The moon (3) passing on in her orbit from opposition, presents phases reversed from those of the second quarter. The proportion of the illumined side visible to us gradually decreases; she becomes gibbous again; rises nearly an hour later each evening, and in the morning lingers high in the western sky after sunrise. She now comes into quadrature, and is in her third quarter. From the third quarter the moon (4) turns her enlightened side from us and decreases to the crescent form again; as, however, the bright hemisphere constantly faces the sun, the horns are pointed toward the west. She is now seen as a bright crescent in the eastern sky just before sunrise. At last the illumined side is completely turned from us, and the moon herself, coming into conjunction with the sun, is lost in his rays. To accomplish this journey through her orbit from new moon to new moon, has required $29\frac{1}{2}$ days — a lunar month.

129. While the moon rises, on the average, fifty minutes later each night, the exact time varies from less than half an hour to a full hour. Near the time of autumnal equinox,

the moon, at her full, rises about sunset a number of nights in succession. This gives rise to a series of brilliant moonlight evenings. It is the time of harvest in England, and hence has received the name of the harvest moon.

130. In the following month (October) the same occurrence takes place, and it is then termed the hunter's moon.

131. The cause of this phenomenon lies in the fact that the moon's path is variously inclined to the horizon at different seasons of the year. When the equinoxes are in the horizon, it makes a very small angle with the horizon; whereas, when the solstitial points are in the horizon, the angle is far greater. In the former case, the moon moving eastward each day about 13°, will descend but little below the horizon, and so for several successive evenings will rise at about the same hour. In the latter she will descend much further each day, and thus will rise much later each night. The least possible variation in the hour of rising is seventeen minutes; the greatest is one hour and sixteen minutes.

132. The moon, in the course of her monthly journey round the earth, frequently passes in front of the stars or planets, which disappear on one side of her disk, and reappear on the other. This is termed an occultation, and is of practical use in determining the difference of longitude between various places on the earth.

133. The telescope reveals to us a region torn and shattered by fearful, though now extinct, volcanic action. Everywhere the crust is pierced by craters, whose irregular edges and rents testify to the convulsions our satellite has undergone at some past time.

134. If the moon should pass through either node at or near the time of conjunction or new moon, she would necessarily come between the earth and the sun, for the three bodies are then in the same straight line. This would cause an eclipse of the sun. If the moon's orbit were in the same plane as the ecliptic, an eclipse of the sun would

occur at every new moon; but, as the orbit is inclined, it can occur only at or near a node.

135. Various singular appearances always attend a total eclipse. Around the sun is seen a beautiful corona, or halo of light, like that which painters give to the head of the Virgin Mary. Flames of a blood-red color play round the disk of the moon; and, when only a mere crescent of the sun is visible, it seems to resolve itself into bright spots, interspersed with dark spaces, having the appearance of a string of bright beads.

136. When, during a solar eclipse, the black disk of our satellite begins slowly to advance over the sun, the natives believe that some terrific monster is gradually devouring it. Thereupon they beat gongs, and rend the air with the most discordant screams of terror and shouts of vengeance. For a time their frantic efforts seem futile, and the eclipse still progresses. At length, however, the increasing uproar reaches the voracious monster; he appears to pause, and then, like a fish rejecting a nearly swallowed bait, gradually disgorges the fiery mouthful. When the sun is quite clear of the great dragon's mouth, a shout of joy is raised, and the poor natives disperse, extremely self-satisfied on account of having so successfully relieved their deity from his late peril.

137. The tides are caused by a great wave, which, raised by the moon's attraction, follows her in her course around the earth. The sun, also, aids somewhat in producing this effect; but, as the moon is 400 times nearer the earth, her influence is far greater.

138. Mars is the first of the superior planets, and the one most like the earth. It appears to the naked eye as a bright red star, rarely scintillating, and shining with a steady light, which distinguishes it from the fixed stars. Its ruddy appearance has led to its being celebrated among all nations. The Jews gave it the appellation of "blazing," and it bore in other languages a similar name. At conjunction its apparent diameter is only about 4″; but once in two years it

comes into opposition with the sun, when its diameter increases to 30″.

139. Mars revolves about the sun at a mean distance of about 140,000,000 miles.

140. Its motion varies in different portions of its orbit, but the average velocity is about 15 miles per second.

141. Its diameter is a little less than 5,000 miles. Its volume is about $\frac{1}{4}$ that of the earth.

142. It has an atmosphere like our own, loaded with clouds, and its seasons do not differ materially from ours. Mars has no moon.

143. We can from the earth watch the formation of polar ice and the fall of snow — in fact, all the vicissitudes of the seasons — on the surface of a neighboring planet.

144. Jupiter is the largest planet. Its peculiar splendor and brilliancy distinguish it from the fixed stars, and vie even with the luster of Venus. It has four moons.

145. Jupiter revolves about the sun at a mean distance of 475,000,000 miles. Its velocity is about 500 miles per minute.

146. Once in thirteen months Jupiter is in opposition, and his distance from the earth is measured by the difference of the distances of the two bodies from the sun. At the expiration of half this time he is in conjunction, and his distance from us is measured by the sum of these distances.

147. Its diameter is about 88,000 miles, or one-tenth of the sun. Its volume is 1,400 times that of the earth, and much exceeds that of all the other planets combined.

148. As the axis of Jupiter is but slightly inclined from a perpendicular to the plane of its orbit, there is but little difference in the length of its days and nights, which are each of about five hours duration. At the poles the sun is visible for nearly six years, and then remains set for the same length of time. The seasons vary but slightly. Summer reigns near the equator, while the temperate regions enjoy perpetual spring.

149. There are well authenticated instances on record of their having been seen by the naked eye.

150. The velocity of light was discovered by an attentive examination of the eclipses of Jupiter's moons, by Romer (a Danish astronomer, in 1617), who was led to discover the progressive motion of light. Before him, it had been considered instantaneous. He noticed that the observed times of the eclipses were sometimes earlier and sometimes later than the calculated times, according as Jupiter was nearest or furthest from the earth. His investigations convinced him that it requires about $16\frac{1}{2}$ minutes for light to traverse the orbit of the earth. Romer's conclusion has since been verified by the phenomena of aberration of light.

151. The velocity of light is about 183,000 miles per second.

152. Saturn, on account of its distance, shines with a feeble but steady pale yellow light, which distinguishes it from the fixed stars. Its orbit is so vast that its movement among the constellations may be easily traced through one's lifetime. It requires two and a half years to pass through a single sign of the zodiac; hence, when once known, it may be easily found again. Saturn has eight moons.

153. Saturn revolves about the sun at a mean distance of 872,000,000 miles. The eccentricity of its orbit is a trifle more than that of Jupiter; so that, while it may at perihelion come 50,000,000 miles nearer than its mean distance, at aphelion it swings off as much beyond.

154. Its distance from the earth is found in the same manner as that of the other superior planets, being least in opposition and greatest at conjunction. As the earth and Saturn occupy different portions of their orbits, the distances between them at different times may vary 200,000,000 miles.

155. Saturn's diameter is about 72,000 miles. Its volume is nearly 750 times that of the earth. Its density is very low indeed, being much less than that of water, and about the same as that of pine wood.

156. The light and heat of the sun at Saturn are only $\frac{1}{100}$ that which we receive. The axis of Saturn is inclined from a perpendicular to the plane of its orbit about 31°. The seasons, therefore, are similar to those on the earth, but on a larger scale. The sun climbs in summer about 8° higher above the horizon, and sinks correspondingly lower in winter. The tropics are 16° further apart, and the Arctic and Antarctic Circles 8° further from the poles. Each of Saturn's seasons lasts more than seven of our years. There is about fifteen years interval between the autumn and spring equinoxes, and between the summer and winter solstices. For fifteen years the sun shines on the north pole, and a night of the same length envelopes the south pole.

157. Uranus may be seen by a person of strong eyesight in a perfectly dark sky, if he previously knows its exact position among the stars. It is very faint, and is due to its great distance from the earth. Were it as near as the sun, it would appear twice as large as Jupiter.

158. Uranus revolves about the sun at a mean distance of 1,754,000,000 miles. Its year exceeds 84 of ours.

159. Its diameter is about 33,000 miles. It is lighter than water, having a density about equal to that of ice.

160. We know but little of the seasons of Uranus. Since its axis lies in the plane of its orbit, the sun winds in a spiral form around the whole planet. The light and heat are only $\frac{3}{1000}$ of that which we receive; the light is about the quantity which would be afforded by 300 full moons. The inhabitants of Uranus can see Saturn, and perhaps Jupiter, but none of the planets within the orbit of the latter.

161. No spots or belts have been discovered with any telescope yet made. The time of rotation and other features so familiar to us in the nearer planets, are unknown with regard to Uranus.

162. Uranus has four moons, of which little is known, except the curious fact that their orbits are nearly perpendicular to the plane of the planet's orbit, and that their

movements are retrograde — *i. e.*, in the same direction as the hands of a watch.

163. Neptune is the far-off sentinel at the very outposts of the solar system, being the most distant planet of which we have any knowledge. It is invisible to the naked eye. and appears in the telescope as a star of the eighth magnitude.

164. Neptune revolves about the sun at a mean distance of about 2,750,000,000 miles. The Neptunian year is equal to nearly 165 terrestrial ones. Its motion in its orbit is the slowest of any of the planets, since it is the most remote from the sun. The velocity decreases from Mercury, which moves at the rate of 105,000 miles per hour, to Neptune, whose rate is only 12,000 miles.

165. Its diameter is about 37,000 miles. Its volume is nearly 100 times that of the earth. Its density is about that of Uranus, a little less than that of water.

166. As the inclination of its axis is unknown, nothing can be ascertained concerning its seasons. The sun gives to Neptune but $\frac{1}{1000}$ the light and heat which we receive.

167. On account of the recentness of the discovery of this planet and its immense distance, nothing is known of its rotation or physical features.

168. Neptune has two moons; one at nearly the same distance from it as our own moon is from the earth. The revolution of this about the planet, which is accomplished in about six days, has furnished the materials for calculating the mass of Neptune.

169. Ærolites are those stony masses which fall to the earth. Shooting-stars are those evanescent brilliant points that suddenly dart through the higher regions of the air, leaving a fiery train behind. Meteors are luminous bodies which have a sensible diameter and a spherical form. They frequently pass over a great extent of country, and are seen for some seconds of time.

170. It is estimated that the average number of meteors that traverse the atmosphere daily, and which are large

enough to be visible to the eye on a dark, clear night, is 7,500,000; and if to these the telescopic meteors be added, the number would be increascd to 400,000,000. In the space traversed by the earth there are, on the average, in each volume the size of our globe (including its atmosphere), as many as 13,000 small bodies, each one capable of furnishing a shooting-star visible under favorable circumstances to the naked eye.

171. The term comet signifies a hairy body. A comet consists usually of three parts: the nucleus, a bright point in the center of the head; the coma (hair), the cloud-like mass surrounding the nucleus; and the tail, a luminous train extending generally in a direction from the sun.

172. Comets appear in every quarter of the heavens, and move in every conceivable direction.

173. When first seen, the comet resembles a faint spot of light upon the dark back-ground of the sky; as it approaches the sun the brightness increases, and the tail begins to show itself.

174. It is not understood whether comets shine by their own or by reflected light. If, however their nuclei consists of white-hot matter, a passage through such a furnace would be anything but desirable or satisfactory.

175. We do not. This assertion seems almost paradoxical, yet it is strictly true. So far are the stars removed from us that we see only the light they send, but not the surface of the worlds themselves.

176. A sidereal day is the exact interval of time in which the earth revolves on is axis.

177. It is found by marking two successive passages of a star across the meridian of any place. This is so absolutely uniform, that the length of the sidereal day has not varied $\frac{1}{100}$ of a second in 2,000 years.

178. The sidereal day is divided into twenty-four equal portions, which are called sidereal hours, and each of these into sixty portions, termed sidereal minutes, etc.

179. A solar day is the interval between two successive passages of the sun across the meridian of any place.

180. If the earth were stationary in its orbit, the solar day would be of the same length as the sidereal; but while the earth is turning around on its axis, it is going forward at the rate of 360° in a year, or about 1° per day. when the earth has made a complete revolution, it must, therefore, perform a part of another revolution through this additional degree, in order to bring the same meridian vertically under the sun. One degree of diurnal revolution is about equal to four minutes of time; hence, the solar day is about four minutes longer than the sidereal day.

181. The civil day extends from midnight to midnight. The present method of dividing the day into two portions of twelve hours each, was adopted by Hipparchus, 150 years B. C., and is now in general use over the civilized world. Until recently, however, very many nations terminated one day and commenced the next at sunset. Under this plan, 10 o'clock on one day would not mean the same as 10 o'clock on another day. The Puritans commenced the day at 6 P.M The Babylonians, Persians, and modern Greeks begin the day at sunrise.

BOTANY.

BOTANY.—Botany is that science which treats of the structure of plants, the functions of their parts, their places of growth, their classification, and the terms which are employed in their description and denomination.

STRUCTURAL BOTANY.—Structural Botany has reference to the parts of which plants are composed.

PHYSIOLOGICAL BOTANY.—Physiological Botany comprises a knowledge, 1st, of the intimate structure of the plant, the minute but admirable machinery through which its forces operate; and, 2d, of the plant's external conformation, the forms and arrangement of the several organs of which it is composed, the laws of symmetry which regulate them, and the modifications they respectively undergo, whether in different plants under different circumstances, or in a single individual during the successive stages of its development.

SYSTEMATIC BOTANY.—Systematic Botany is the study of plants in their relations to one another; as forming a *vegetable kingdom*, which embraces an immense number of species, differing in some respects, agreeing in others, and

therefore capable of being grouped into *kinds* or *genera*, into *orders*, *classes*, etc.

PLANT.—A plant is an organic body, destitute of sense and spontaneous motion, and having, when complete, a root, stem, and leaves. though consisting sometimes only of a single leafy expansion, or a series of cellules, or even a single cellule alone. The nutriment of a plant is taken in by absorbing moisture or air, and is elaborated in the leaves or surface tissues, and is not received into any internal cavity or stomach, like that of animals. In the plant, oxygen is excreted, and carbonic acid is a source of nutriment, while in animals, carbonic acid is excreted, and oxygen is essential to life.

TISSUE.—The parts of which organized bodies are composed. These parts are made up of cells of different shapes and textures, differently put together.

CELL.—A minute, inclosed space or sac, filled with fluid, making up the cellular tissue of plants and originating the parts by their growth and reproduction.

CELLULAR TISSUE.—A tissue composed of an indefinite number of minute cells communicating with each other. It is composed of an aggregation of little bladders, or sacs, which, by their accumulation and mutual cohesion, make up the root of the plant.

PULP.—The juicy tissue found beneath the rind of fruits, etc.

VESICLE.—A small bladderlike body in the substance of a vegetable, or upon the surface of a leaf.

ROOT.—The usually descending axis of a plant, destitute of leaves or nodes, which increases in length by growth at or near its end only, and which usually gives off similar branching parts, called *rootlets*, or adventitious roots.

STEM.—A stem is that part of a plant which bears or has borne leaves or their rudiments; the ascending axis of growth. It may be either subterranean, or exposed to the air and light.

LEAF.—A leaf is an expansion of the bark of a plant. It consists of cellular tissue or parenchyma through which vascular tissue in the form of veins, ribs, and nerves, ramify; the whole being covered with epidermis through which in most cases pass minute orifices, called *stomata*. Leaves are either *sessile*, that is, directly seated on the branch, or *petiolate*, that is, furnished with footstalks or petioles. The angle formed by the leaf and the branch is called the *axil*, and here it is that new leaf-buds usually appear. The young leaf is generally protected by some sort of sheath called a *stipule*, which drops off when the leaf has expanded. When leaves fall annually, they are styled *deciduous*, otherwise they are *evergreen*. The functions of leaves seem to be to expose the sap to the air and light, whereby it becomes elaborated and fitted for the formation of wood, new leaves, etc.

COMPOUND LEAF.—A compound leaf is a leaf having more than one blade attached to the same petiole.

LEAFLET.—A leaflet is a separate piece or partial blade of a compound leaf.

BUD.—The buds are organized parts of a plant, of an oval, round, or conical form, and containing the rudiments of future branches, leaves, or flowers, which remain without *breaking*, on producing them, until circumstances form their development. The same buds, accordingly, as circumstances vary, produce either flowers or leaves. Buds spring from the alburnum. They are formed, at first, only in the axils of leaves; but if these buds are destroyed, what are termed *adventitious* or *latent buds* are formed, in the neighborhood of the regular buds.

LEAF-BUD.—A leaf-bud is the rudiment of young branches, made up of scales surrounding a minute axis, which directly communicates with the cellular tissue of the stem. Stimulated by light and heat, they form branches, or, if artificially removed from the plant, they serve to multiply the individual from which they have been taken.

NUCLEUS.—The middle, fleshy, pulpy mass of an ovule.

OVULE.—The rudimentary state of a seed. It consists essentially of a nucleus developed directly from the placenta.

PLACENTA.—That part of a plant or fruit to which the seeds are attached.

POLLEN.—The powdery or other matter usually contained in the cells of an anther, by whose action on the stigma the fertilization of the ovules is accomplished. Pollen-cells are the cavities of an anther, in which the pollen is formed; pollen-grains or granules the separate particles of pollen; and pollen-tubes membranous tubes emitted by pollen, and conducting the fluid which the pollen secretes down the style.

ANTHER.—That part of the stamen of a flower which is at the top of the filament; it is usually divided into two cavities, which are filled with pollen, minute grains that are discharged when ripe, and these falling upon the pistil impregnate the ovary. Anthers are generally yellow, that being the usual color of the pollen.

STIGMA.—The stigma is that part of the pistil which receives the pollen when it issues from the anther. It is glandular, and thus detains the powder.

STYLE.—The cylindrical or tapering portion of the pistil between the ovary and the stigma.

STAMEN.—The male organ of flowers for secreting and furnishing the pollen or fecundating dust. It consists of the *anther*, or fertilizing part, borne on a stem called the *filament*.

FILAMENT.—The thread-like part of the stamens supporting the anther.

PISTIL.—The female organ of flowers, which in due time is changed into the fruit. It is in the center of the flower, and, when perfect, consists of the germ or *ovary*, at the base; the *style* and the *stigma*, at or near the summit. From the stigma exudes a viscous fluid, which retains the grains of pollen that fall upon it.

OVARY.—That part of the pistil which contains the seed, and in the course of development becomes the fruit.

DISK.—(a). The whole surface of a leaf. (b.) The central part of a radiate compound flower. (c.) A part of the receptacle enlarged or expanded under or around the pistil.

PARENCHYMA.—The soft cellular tissue of plants, such as that which forms the pith of stems, the outer bark, and the green pulp of leaves.

BARK.—That part of a tree which is external to the wood. When young, it is cellular, and similar to the pith. Afterwards, it is composed of both cellular and vascular tissue, the latter being next the wood, and called *liber*. On the outside of the liber is the cellular envelope, and outside this is the outer covering, or rough bark. It is observed that trees stripped of their bark in the time of the sap, and suffered to die, afford heavier timber, more uniformly dense, stronger, and fitter for service, than those which are cut down in their healthy state.

PITH.—The soft spongy substance in the center of the stems of the plants. It consists of minute cells closely packed together, sometimes of a rounded or oval shape, but usually angular. The young pith abounds with fluid, which serves to nourish the plant. Afterwards it becomes dry, and often disappears altogether.

LIBER.—The inner bark of plants, lying next to the wood. It usually contains a large proportion of woody, fibrous cells, and is, therefore, the part from which the fiber of the plant is obtained, as that of hemp, etc.

DURAMEN.—The heart-wood, or that part of the timber of a tree which becomes hardened by matter deposited in it. It is next the center in Exogens, and next the circumference in Endogens.

ALBURNUM.—The soft white substance between the inner bark and the wood of exogenous trees. In America it is more usually known as *sapwood*.

EXOGENS.—The 7th and largest class of plants in the classification of Lindley, corresponding with the *Dicotoledons*. The name Exogen is derived from the Greek words signifying "outwards," and "to grow," meaning growing outwardly, and has reference to the mode in which the woody circles are produced, viz., from the center outwardly towards the circumference. The age of an exogenous tree, particularly in temperate climates, may be determined by counting the number of zones or circles in the woody stem, each circle marking one year's growth, and the last-formed circle being external.

ENDOGENS.—The 4th class of plants in the system of Lindley, and so called because their stems grow by successive additions to the inside; that is to say, by the addition of woody vessels towards the interior, so that the outer part is the oldest and hardest. In endogenous plants, in which only a single seed-lobe is attached to the embryo, there is no distinction of pith-wood, bark, and medullary rays, as in exogenous stems. Palms, grasses, orchids, and lilies, fall into this important class, which in warm countries contains trees of large size.

VESSEL.—(a) A canal or tube, of very small bore, in which the sap is contained and conveyed. (b) An elongated tubular cell, with spiral deposits, in distinction from *ducts*, in which the deposits are pitted.

VASCULAR.—Of, or pertaining to the higher division of plants, the phenogamous, all of which are vascular, in distinction from the cryptogams, which to a large extent are cellular only.

VASCULAR PLANTS.—Plants composed of vascular tissue, including all plants except a part of the cryptogams, the mosses, the sea-weeds, the lichens, and the liverworts, these being simply cellulose.

CELLULOSE.—One of the substances constituting the cellular tissue of plants, being the material which forms the walls or sides of the vegetable cells, while lignine is that

which fills those cells or covers their walls. It consists, like starch, of carbon, hydrogen, and oxygen, and is convertible into starch and sugar.

CRYPTOGAMIA.—The class of flowerless plants, or those which do not fructify by the means usual to others.

DUCT.—A tubular vessel in a plant, through which the sap or juices pass.

LATEX.—A milky juice contained in cavities of certain plants. It has no regular circulation through the plant, but possesses the peculiar active properties of it.

RAPHIDES.—Raphides are minute transparent crystals found in the tissues of plants.

EPIDERMIS.—The external layer of the bark of a plant.

HAIRS.—Hairs are small delicate transparent conical expansions of the epidermis, consisting of one or more cells.

PRICKLES.—A hard conical sharp elevation of the epidermis; hence, *prickly*, furnished with prickles, as the stem of a rose.

STOMA.—The minute breathing pores of leaves or other organs, opening into the intercellular spaces, and bordered by a contractile rim.

EMBRYO.—A fleshy body occupying the interior of a seed, and constituting the rudiments of the future plant. The embryo is divided into three parts, corresponding to the root, stem, and leaves of the perfect plant.

CROWN.—An appendage at the top of the claw of some petals; called also *corona*.

PETAL.—A leaf of a flower, as a sepal is a leaf of a calyx. When the corolla consists only of one leaf, that is, forms a tube around the stamens and pistils, it is termed monopetalous; if divided into separate leaves, it is said to consist of two, three, or more petals.

SEPAL.—A leaf or division of the calyx.

CALYX.—The outer covering, or leaf-like envelope of a flower.

COROLLA.—That more or less colored part of a flower which intervenes between the calyx and stamens; its parts are called *petals*.

STOLON.—A sucker which at first appears at the surface of the earth, and then turns downwards, piercing the soil or rooting into it.

SUCKER.—The shoot of a plant from the roots or lower part of the stem; so called, perhaps, from diverting nourishment from the body of the plant.

RUNNER.—A slender branch running along the ground, as in the strawberry, and forming at its extremity roots and a young plant.

OFFSET.—A prostrate shoot, which takes root, but does not, like a runner, branch again.

SPINE.—A thorn or sharp process from the woody part of a plant.

TENDRIL.—A filiform, spiral shoot of a plant that winds round another body for the purpose of support.

ROOT-STOCK.—A root-like trunk under ground, yearly producing young branches; a rhizoma.

TUBER.—A roundish underground succulent stem, covered with buds, from which new plants or tubers are produced; as the potato.

CORMUS.—A fleshy subterranean stem or root of a round or oval figure and a uniform, compact texture; similar to that of the Indian turnip, or crocus. Also written *corm*.

BULB.—A spheroidal body growing from a plant either above or below the ground (usually the latter), which is strictly a *bud*, consisting of a cluster of partially developed leaves, and producing, as it grows, a stem above, and roots below, as in the onion, tulip, etc. It differs from a *tuber* in not being solid.

BULBLETS.—Bulblets are buds with fleshy scales, which arise in the axils of the leaves of several plants, such as the common Lilium bulbiferum of the gardens, and at length

separate spontaneously, falling to the ground, where they take root, and become independent plants.

PETIOLE.—The stem which sustains the leaf of a plant; hence, a leaf growing on such stalk is said to be *petiolate.*

LAMINA.—The broad or spreading part of a petal, as distinguished from the tub or claw. Also the broad part of a leaf, as distinguished from a stalk.

CLAW.—A slender appendage or process, formed like a claw; as the slender base of some petals, as those of the pink.

SESSILE.—Issuing directly from the main stem or branch; without a petiole or footstalk; as, a *sessile* leaf.

BASE.—That extremity of a leaf, fruit, etc., at which it is attached to its support; or, the portion of the blade next the stem of a plant, is called the *base;* its opposite extremity, the *apex.*

VENATION.—The disposition of veins or ribs in a leaf or other organ.

RIB.—The continuation of the petiole along the center of a leaf, and from which the veins ramify.

VEIN.—A small rib or branch of the frame-work of leaves, etc.; called also nerve.

VEINLET.—A small vein, branching out from a larger one.

MIDRIB.—A continuation of the petiole, extending from the base to the apex on the lamina of a leaf.

SINUS.—A hollow of a curved or rounded figure between two projecting lobes.

PELTATE.—Designating a leaf or any other organ fixed to a stalk by the center, or by some point distinctly within the margin.

ENTIRE.—Consisting of a single piece, as a corolla; not divided at the edge; as, an *entire* leaf.

LOBE.—A rounded projection or division of a leaf.

SERRATE.—Having sharp straight-edged teeth pointing to the apex, as in the Sweet-pepper Bush.

DENTATE.—Where the sharp straight-edged teeth are not directed towards the apex of the leaf.

CRENATE.—Where the teeth are rounded.

REPAND.—Having an undulating or slightly sinuous margin, as in the common nightshade; said of a leaf.

SINUATE.—Having the margin alternately bowed inward and outward; strongly wavy on the margin, with alternate concavities and convexities; having rounded lobes separated by sinuses.

PECTINATE.—A word which describes that form of marginal division in which the segments are arranged after the manner of the teeth of a comb.

LYRATE.—Lyre-shaped, or spatulate and oblong, with small lobes toward the base; as a *lyrate* leaf.

RUNCINATE. — Having the lobes convex before, and pointing toward the base, as in the dandelion; saw-shaped.

PALMATE.— Spreading from the apex of a petiole, or the divisions of a leaf, or leaflets, so as to resemble the hand with outspread fingers.

PEDATE.—Designating a palmate leaf when its two lateral lobes are divided into smaller segments, the midribs of which do not run directly into the common central point.

TRUNCATE.—Terminating very abruptly as if a piece had been cut off; as the leaf of the tulip-tree

MUCRONATE. — Terminating abruptly, or in short, spinous processes.

ACUMINATE. — Having a long, projecting, and highly tapering point.

STIPULE.—An appendage at the base of petioles or leaves, usually somewhat resembling a small leaf in texture and appearance.

CAULIS.—An herbaceous stem, bearing both leaves and fructification.

CAULINE.—Growing immediately on a caulis.

RAMEAL.—Such leaves as belong to the branches.

BRACT.—A small leaf or scale, from the axil of which a flower or its pedicel proceeds. Bracts in general are the leaves of an inflorescence, more or less different from ordinary leaves.

VERNATION.—The manner in which leaves are arranged within the leaf-bud.

EXHALATION.—A vital function by which the stomach, or breathing-powers, are made to discharge a large portion of the water introduced by absorption through the roots.

NUTRITION.—The act or process of promoting the growth or repairing the waste of animal or vegetable life. In its widest signification, *nutrition* includes all the actions which concur in supporting the processes of assimilation, and the change or removal of matter of the tissues, as digestion, absorption, etc.

INFLORESCENCE.—A term used to designate the arrangement of flowers upon the stem or branch.

PEDUNCLE.—The stem or stalk that supports the flower and fruit of a plant.

PEDICEL.—The ultimate division of a common peduncle; the stalk that supports one flower only, when there are several on a peduncle,

RACHIS.—The axis of several kinds of inflorescence; sometimes applied to the stipe of a fern, but not properly.

RACEME.—A kind of inflorescence consisting of a peduncle with short lateral branches. It may be either simple or compound, bare or leafy.

CORYMB.—A species of inflorescence, in which the lesser or partial flower-stalks are produced along the common stalk on both sides, and, though of unequal length, rise to the same height, so as to form an even surface.

UMBEL.—An umbel only differs from a corymb in having all the pedicels arising from the same point.

SPIKE.—The spike is the same as a raceme, except that the flowers are *sessile*, or destitute of stalks; as in the plantain.

SPADIX.—A spadix is a spike enveloped by a large bract or modified leaf.

CATKIN.—The catkin is merely a particular kind of spike with scaly bracts, crowded together, the whole usually falling off, after flowering in a single piece; as in the Willow, the Poplar, the Birch, and many other trees.

CAPITULUM.—The capitulum, or head, a term which is applied to a globular cluster of sessile flowers, as in the Button Bush, may be conceived to arise from the shortening of the pedicels either of an umbel or a corymb. It bears the same relation to these, that the spike does to the raceme. It differs from the spike only in its very short axis.

AESTIVATION.—The process of flowering, with special reference to the arrangement of parts in a flower-bud; prefloration.

DEHISCENCE.—The opening of pods and of the cells of anthers at maturity, as to emit seeds, pollen, etc.

FOLLICLE.—A seed-vessel, opening on one side longitudinally, and containing several seeds; as seen in the fruit of Larkspur and columbine.

LEGUME.—A fruit formed of a single carpel, and dehiscent by both the ventral and dorsal sutures, so as to separate into two valves; as in the bean and pea.

DRUPE.—A pulpy, coriaceous, or fibrous pericarp or fruit, without valves, containing a nut or stone with a kernel. It is succulent in the plum, cherry, apricot, peach, etc.; dry and sub-coriaceous in the almond and horse-chestnut, and fibrous in the cocoa-nut.

ACHENIUM.—A small, dry, indehiscent pericarp, containing a simple free seed, as in the buttercup; called a *naked-seed* by the earlier botanists.

CREMOCARP.—A term applied to such fruits as those of the umbellifers, consisting of two or more indehiscent inferior one-seeded carpels adhering round a distinct and separable axis.

CARYOPSIS.—A thin and membranaceous pericarp, like an achenium, but adherent to the surface of the seed, so as to be inseparable from its proper covering. The grains of wheat, maize, and most grasses, are examples.

UTRICLE.—An utricle is a caryopsis which does not adhere to the seed.

NUT.—A nut is a hard one-celled and one-seeded indehiscent fruit, like an achenium, but produced from an ovary of two or more cells with one or more ovules in each, all but a single ovule and cell having disappeared during its growth.

SAMARA.—A samara is a name applied to a nut or achenium, having a winged apex or margin; as in the birch and elm.

BERRY.—A berry is an indehiscent fruit which is fleshy or pulpy throughout; as the grape, gooseberry, and persimmon.

POME.—A fleshy or pulpy pericarp without valves, containing a capsule or capsules; as the apple, pear, and the like.

PEPO.—An indehiscent fruit, externally firm and internally pulpy, as that of the cucumber, melon, squash, and the like.

CAPSULE.—A capsule is a general term for all dry and dehiscent fruits, resulting from a compound ovary, whether opening by valves, or bursting irregularly, as in lobelia, or shedding the seeds through chinks or pores, as in the poppy.

SILIQUE.—An oblong seed-vessel, consisting of two valves, and a dissepiment between, and opening by sutures at either margin, with the seeds attached to both edges of the dissepiment, and alternately upon each side of it.

PYXIDIUM.—A pod which divides circularly into an upper and lower half, of which the former acts as a kind of lid.

CONE.—The conical fruit of several evergreen trees, as of the pine, fir, cedar, and cypress. It is composed of woody scales, each one of which has a seed at its base.

LICHEN.—One of an order of cellular, flowerless plants, having no distinction of leaf and stem, usually of scaly, expanded, frond-like forms, but sometimes imitating the forms of branches of trees. They derive their nourishment from the air, and generate by means of spores. The species are very widely distributed, and form irregular spots or patches, usually of a greenish or yellowish color, upon rocks, trees, and various bodies, to which they adhere with great tenacity. They are often improperly called *rock-moss*, or *tree-moss*.

PLANTS, SHRUBS, FLOWERS, AND FRUITS.

ACACIA.—A genus of leguminous trees and shrubs, usually with thorns and pinnate leaves, and of an airy, elegant appearance. The acacia grows in all tropical parts of both the old world and the new, and also in Australia and Polynesia. A few species only are found in temperate climates. The *Acacia vera* yields gum arabic.

AGAVE (American Aloe).—A genus of American plants differing from aloes only in having an inferior ovary, and in their sensible properties. The fibers of some species have been manufactured into ropes and paper, and the juice into an intoxicating liquor called *pulque*, from which in its turn an inferior brandy is distilled. The American Aloe, possesses a handsome appearance when in flower. A tall stem, like a flag-pole, rises from the middle of the plant, and the flowers are arranged candelabrum-fashion at the upper part. It is from ten to seventy years, according to climate, in attaining maturity, when it produces its gigantic flower-stem, forty feet in height and perishes.

ANANAS.—A genus of herbaceous plants of tropical America, with leaves somewhat resembling those of the Aloes. The pine-apple is the fruit of Ananas. It resembles, in shape, the cone of the pine-tree, whence it has derived its name.

ANONA.—A genus of tropical or subtropical plants, including the sour-sop. It is found in hot latitudes, with large roundish pulpy fruit, which in some species is used as food.

HORDEUM.—The Barley, one of the most valuable of the genera of grasses. As a corn-plant, barley is perhaps one of the most early cultivated, and its different varieties can be grown under a wider range of climatal differences than almost any other variety of cereal. The genus may be distinguished by its spikelets being in threes, arranged on opposite sides of the rachis, hence forming a bilateral spike. Of the many varieties of cultivated barley, those known as distichous or two-rowed barley are those more commonly cultivated, for in them the seed is tolerably uniform in size, and so a better sample is produced, and we believe that it is even more productive than the six-rowed form. This latter, however, is frequently attempted to be employed in farming; but as the lateral florets are seldom as plump as the central one, a very uneven sample is the result.

BAROMETZ.—A singular vegetable production, consisting of the prostrate hairy stem of the fern, which, when prepared in a particular way, has the appearance of a lamb.

CACTUS.—A genus of succulent plants, remarkable for having thick, fleshy stems, generally without leaves, and often armed with spines; for having few, if any, branches; for being often of grotesque shapes, and for having flowers often of great beauty and sweetness. It is a native of tropical America.

COFFEE.—The berries of a tree growing in Arabia, Persia and the warm climates of Asia and America. The flowers

grow in clusters at the root of the leaves, close to the branches, are pure white, and fragrant. Each berry contains two grains of coffee.

COCHINEAL-FIG.—A plant of Central and Southern America, of the cactus family, extensively cultivated for the sake of the cochineal insect, which lives on it.

CUSTARD-APPLE.—A plant, a species of the anona, growing in the West Indies, whose fruit is of the size of a tennis-ball, of an orange color, containing a yellowish eatable pulp, of the consistence of custard.

DURION.—The fruit of the *durio* (a genus of trees). It is about the size of a melon, inclosed in a prickly husk, and is much esteemed for its delicious flavor.

EPIPHYTE.—A plant which grows on other plants, but does not derive its nourishment from them; an air plant.

FLAX.—A plant having a single, slender stalk, about a foot and a half high, with blue flowers. The fiber of the bark is used for making thread and cloth, called *linen*, *cambric*, *lawn*, *lace*, etc. Linseed oil is obtained from the seed.

FLY-TRAP.—A plant, sometimes called *Venus's fly-trap*, the leaves of which are fringed with stiff bristles, and fold together when certain hairs on their upper surface are touched, thus seizing insects that light on them.

FOX-GLOVE.—A handsome biennial plant, whose leaves are used as a powerful medicine, both as a sedative and diuretic; probably so called from the fancied resemblance of the flowers to the fingers of a glove.

GENTIAN.—A plant which is found in the Alpine meadows of Middle Europe, and has a bright yellow flower. Its root has a yellowish-brown color, and a very bitter taste, and is used as an ingredient in stomachic bitters; called also *felwort*. There are several other species, one of which, having a beautiful fringed corolla of a sky-blue color, is the fringed gentian.

HONEY-SUCKLE.—One of several species of flowering plants, much admired for their beauty and some for their

fragrance. The name *honey-suckle* is said to be derived from the practice by children of sucking the corolla to obtain the drop of sweet juice at its base.

Hop.—A plant having a long, twining stalk. The female flowers, or catkins, constitute the hops of commerce. Their scales and the fruit secrete an aromatic resin called *Lupuline*. This is the active part of the plant, and is largely used in brewing and in medicine. The plant is very widely distributed, but it may have been originally a native of Europe.

Horse-Tail.—A leafless plant, with hollow and rush-like stems. It is of the genus *Equisetum*, and is allied to the ferns. The *shrubby horse-tail* is of the genus *Ephedra*. The horse-tail is also called "A Turkish standard." Commanders are distinguished by the number of *horse-tails* carried before them, or planted in front of their tents. Thus, the sultan has seven, the grand-vizier five, and the pachas three, two, or one.

Hyacinthus.—A well-known genus plant of very handsome bulbs, of which large numbers of garden varieties are grown in Holland for exportation.

Iceland-Moss.—A kind of lichen found in the mountainous districts of Europe. It has a slightly bitter taste, and is used both as a tonic and for its nutritive properties.

Leek.—A plant of the genus *Allium*, but without a proper bulb, having, in the place of this, a cylindrical body of succulent leaves, which are eatable. It is regarded by Welshmen as a national emblem.

Lily.—An endogenous, bulbous plant, having a regular perianth of six colored pieces, six stamens, and a superior three-celled ovary. The flowers are generally very showy, and some are very fragrant.

Lizard-Tail.—A perennial plant found growing in marshes, and having white flowers crowded in a slender terminal spike, somewhat resembling in form a lizard's tail; whence the name.

LUNG-WORT.—A perennial plant found on alluvial banks over a great part of the United States and Canada. The leaves are used in hemorrhage from the lungs, and pulmonary affections generally. It is so called because the spotted appearance of the leaves resembles that of a diseased lung.

MANDRAKE.—A low plant, having a fleshy root, often forked, and supposed to resemble a man. It was therefore supposed to have animal life, and to cry out when pulled up. All parts of the plant are strongly narcotic.

MISTLETOE.—A parasitic evergreen plant, bearing a glutinous fruit. The radicle is peculiar in always turning toward the object to which the plant is attached. When found upon the oak, where it is rare, it was an object of superstitious regard among the Druids. A bird lime is prepared from its fruit.

MYRTLE.—A plant of the genus *Myrtus*, of several species. The common myrtle rises, with a shrubby upright stem, eight or ten feet high. Its branches form a close, full head, thickly covered with ovate or lanceolate evergreen leaves. It has small, pale flowers from the axils, singly on each footstalk. The ancients considered it sacred to Venus.

NARCISSUS.—A genus of flowering plants, of several species, comprising the daffodils, jonquils, and the like. They have bulbous, perennial roots, but annual leaves and flower-stalks.

ORCHIS MASCULA.—An endogenous plant having the stamens and pistils united in a single column, around which the petals are irregularly arranged. The flowers are usually fragrant, of great beauty, and singular in form. It has usually small, round tubers, and is found all over the world. Among familiar species are the lady's-slipper, the putty-root, and the salep.

PAPYRUS.—A species of reed or flag common in many warm countries, and especially in Egypt, from which the ancients made a material for writing upon, by taking the

layer between the flesh and thick bark of the plant, and uniting strips with a glutinous substance under pressure.

PEPPER.—A climbing plant and its fruit, of the genus *Piper*, of which there are very numerous species. The leaves are oval, and the flowers white. There are four kinds of pepper—the black, the white, the long and cubebs. The black pepper is the produce of Java, Sumatra, Ceylon, and other Asiatic countries; the white pepper is the black pepper decorticated; the long pepper is the fruit of a different species, also from the East Indies. It consists of numerous grains attached to a common footstalk. Cubebs are brought from Java, Nepal, Sierra Leone, and the Isle of France.

PRICKLY-PEAR.—A species of *Cactus*, a fleshy and succulent plant, destitute of leaves, covered with spines, and consisting of flattened joints inserted upon each other. It produces a purplish, edible fruit.

RHODODENDRON.—A genus of shrubs or small trees having handsome evergreen leaves, and remarkable for the beauty of their rose-colored or purple flowers; rose-bay.

SWEET-SOP.—A shrub or tree, allied to the custard-apple. It grows in the West Indies, and bears a greenish fruit, sweet and pulpy.

RICE.—A plant of the genus *Oryza*, and its seed. There is only one species of this plant. It is cultivated in all warm climates, and the grain forms a large portion of the food of the inhabitants. In America, it grows chiefly on low, moist land, which can be overflowed. It is very light and nutritious food, and easy of digestion.

SUN-DEW.—A plant of the genus *Drosera*, the leaves of which are furnished with small, bristle-like glands, which exude drops of a clear fluid, glittering like dew-drops, whence the name.

TARO.—A plant of the *Arum* family, having leaves like a water-lily, and large, thick, oblong roots, which, when baked, are used as food in the tropics.

TEASEL.—A plant of the genus *Dipsacus*, of which one species bears a large burr or flower-head covered with stiff, prickly, hooked awns or bracts, which, when dried, is used for raising a nap on woolen cloth.

TEPHROSIA.—A genus of leguminous shrubs, mostly found in tropical countries; so called from a silky down or pubescence of an ashy-gray color, with which they are generally covered.

VICTORIA REGIA.—A genus of aquatic plants named in honor of Queen Victoria. The V. *regia* is a native of Guiana and Brazil; its large, spreading leaves are from three to five feet in diameter, and have a rim from three to five inches high; and its immense rose-white flowers, when fully expanded sometimes attain a diameter of twenty-three inches.

ALNUS RUBRA (Tag Alder).—A well-known shrub, growing on the borders of ponds and rivers, and in swamps. The bark is used as a medicine in scrofula, and some forms of cutaneous disease.

ASCLEPIAS TUBEROSA (Pleurisy Root).—A genus of plants including the milk weed, swallow-wort, and some other species having medicinal properties. It is said to be useful in dropsy, asthma, dyspepsia, worms, scrofulous and rheumatic disorders. The action of the heart is enlarged under its use.

BLACK COHOSH (Actea Racemosa).—A perennial plant which grows in all parts of the United States and Canada. It is known by the common names of black snake-root, rattle-root, rich-weed, and squaw-weed. The root is used as a remedy and possesses an undoubted influence over the nervous system, having been successfully used in epilepsy, nervous excitability, asthma, delirium tremens, and many spasmodic affections.

COLLINSONIA CANADENSIS (Stone Root).—A perennial plant found growing in rich, moist woods, from Canada to Florida, and is known in different parts of the country as

stone-root, horse-weed, hard hack, and knot-grass. It has been found beneficial in chronic catarrh of the bladder, gravel and dropsy.

Coptis Trifoliata (Gold Thread).—A small evergreen plant, growing in wet, boggy situations, in the Northern and Middle States and Canada. The root is the part used in medicine. It is used with benefit as a local application in aphthous sore mouth, and as a gargle in ulcerated sore throat.

Cornus Florida (Dogwood).—A small tree which grows in swamps and moist woods in various parts of the United States and Canada. The bark, which is the part used in medicine, increases the force of the pulse, and elevates the temperature of the body. It has been successfully used as a substitue for cinchona in the treatment of intermittent fever, and may also be used with advantage in typhoid and typhus fevers.

Datura Stramonium (Thorn-Apple).—A perennial plant commonly called thorn-apple and Jamestown-weed or jimpson, and is found growing in various parts of both Europe and America. The dried leaves and the ripe seeds are the parts used in medicine. This plant possesses powerful narcotic properties, and is used by physicians as an anodyne and antispasmodic. It sometimes acts as an anodyne when opium and belladonna fail, but must always be used with extreme caution,

Erigeron (Canada Fleabane).—There are several varieties of this plant, including the Canada fleabane, growing together and having similar properties, and therefore described as one. They grow abundantly in various parts of the United States and Canada. The whole herb is used as a medicine in affections of the bladder and kidneys, and also in dropsy, gout, and diabetes.

Eupatorium Perfoliatum (Boneset).—A perennial plant abounding in most parts of the United States, and is known by the common names, thoroughwort, crosswort,

Indian sage, and feverwort. The tops and the leaves are the parts used medicinally. Boneset is a common and useful remedy in colds, catarrh, fevers, dyspepsia, and general debility.

Geranium Maculatum (Cranesbill).—A perennial plant commonly known by the names crowfoot and alum root. It is a native of the United States, growing in low grounds and open woods all over the country. The root is the part used in medicine, and yields with alcohol an extract called *geraniin.* It is a superior agent in the first stages of dysentery, diarrhoea, and cholera morbus. The tincture is an excellent local application in sore throat and ulceration of the mouth.

Hamamelis Virginica (Witch Hazel).—A perennial shrub growing in almost all sections of the United States, and in different parts is known by the common names striped alder, winter bloom, snapping, and spotted alder. The bark and the leaves are the parts used in medicine. Witch hazel is tonic, astringent, and sedative, and is used in hemorrhages, and diarrhoea, and dysentery, and excessive mucous discharges. Locally it is used as a wash for sore mouth, and for scald head.

Inula Helenium (Elecampane).—This is a very large herbaceous plant yielding a starch called *inulin.* It has been used in medicine since a very early age. The chief use of elecampane is in lung affections, derangement of the liver, and general debility.

Liriodendron Tulipifera (White Wood).—A large American tree, commonly known as American poplar and cypress tree. The bark is aromatic, stimulant and tonic, and has been used successfully in intermittent fever, chronic rheumatism, hectic fever, night sweats and the diarrhoea attending consumption.

Lobelia Inflata (Lobelia).—A common weed growing in waste fields, and by the roadsides throughout the United States and Canada. It is known by the common

names of Indian tobacco, and asthma root. All parts of the plant are used in medicine. Lobelia is an active emetic, and in small doses a diaphoretic and expectorant. It is of especial use in spasmodic asthma, and is used also in catarrh, croup, whooping cough and other affections of the air-passages and lungs. By its nauseating properties it is very efficacious in subduing spasm.

Lycopus Virginicus (Bugle-Weed).—A perennial plant which grows in moist situations all over the United States. It is sedative, tonic, astringent and narcotic, and has been used successfully in incipient consumption, bleeding from the lungs, and other hemorrhages. It allays irritation, diminishes the frequency of the pulse, and lessens cough. It is said to have cured diabetes when all other means were useless.

Plantago Major (Plantain).—A perennial plant growing in rich, moist places both in Europe and America. It is useful in scrofula, diarrhoea, dysentery and piles. The juice, in ounce doses internally, and also applied to the wounds, is in some repute as an antidote to the bites of poisonous snakes. An ointment of the bruised leaves is useful in salt rheum, sores and old ulcers.

Rumex Crispus (Yellow-Dock). — There are several varieties of the dock family used in medicine. They possess similar properties, but the yellow-dock is the one most commonly used. They are all common in various parts of the United States. Dock is said to have proved useful in scrofula, scurvy, leprosy, etc. An ointment of yellow-dock and root-bark of the false bitter-sweet is confidently affirmed by others, to form an infallible remedy for the itch.

Spigelia Marilandica (Pink Root).—This plant is known also by the common names of wormgrass, Indian pink-root, and star-bloom. It is a perennial plant and grows in various parts of the United States. Pink-Root is a well-known worm remedy, possessed of narcotic and cathartic powers. If taken in large doses it is poisonous.

Taraxacum Dens-Leonis (Dandelion).—This plant is a native of Greece, but is now found growing abundantly in fields, gardens, and along the roadsides throughout Europe and America. The root is the part used in medicine, and should be collected early in the autumn, while the plant is in flower. Dandelion has a specific action on the liver, exciting it to secretion when languid. It is used with good effect in dyspepsia, diseases of the liver and spleen, and in irritable conditions of the stomach and bowels.

Scutellaria Lateriflora (Scullcap).—A perennial herb, growing in damp places throughout the United States. It is sometimes known as hood-wort and mad-weed. The whole herb is used in medicine, and in such diseases as delirium tremens, tetanus, St. Vitus's dance and convulsions, as well as in ordinary diseases of the nerves.

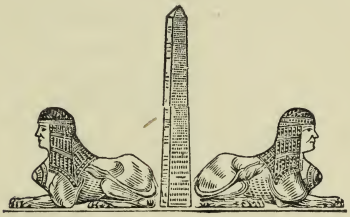
Sanguinaria Canadensis (Bloodroot).—This is a perennial plant found growing throughout the United States and Canada. The root yields an active principle named *sanguinarin*, and is an acrid emetic, with narcotic and stimulant properties. In small doses it excites the stomach, and accelerates the circulation; more largely given, produces nausea and consequent depression of the pulse; and in the full dose occasions active vomiting. Bloodroot has been given in typhoid pneumonia, catarrh, croup, rheumatism, dyspepsia, etc., etc., either as an emetic, nauseant, or alternative, and its virtues are highly praised by many physicians.

Populus Tremuloides (American Poplar).—A tree found growing abundantly in the province of Quebec and in the Northern and Middle States. The bark, which is the part used in medicine, is tonic and febrifuge, and has been used with success in intermittent fever, in debility, want of appetite, feeble digestion, and chronic diarrhoea.

Spiraea Tomentosa (Hardhack).—A common American shrub, known as steeplebush and meadow-sweet. The root, which is the part used in medicine, is tonic and astringent,

and is peculiarly adapted for cases of debility. It is used in diarrhoea, and is an excellent remedy for the summer complaints of children.

XANTHOXYLUM FRAXINEUM (Prickly Ash).—An American tree found growing in woods and on river banks in various parts of the United States and Canada. It is known by the common names, yellow wood, pellitory and toothache bush. The bark and the berries are the parts generally used in medicine. It is stimulant, tonic and alternative, being used in languid conditions of the system, in rheumatism, derangements of the liver, and is a valuable tonic in low fevers.



INDEX.

TITLE PAGE, - - - - - - - 1
PREFACE, - - - - - - 3
HISTORY QUESTIONS, - - - - - 5
HISTORY ANSWERS, - - - - - 28
GRAMMAR QUESTIONS, - - - - - 85
GRAMMAR ANSWERS, - - - - - 92
CIVIL GOVERNMENT QUESTIONS, - - - - 110
CIVIL GOVERNMENT ANSWERS, - - - 116
GEOGRAPHY QUESTIONS, - - - - - 132
GEOGRAPHY ANSWERS, - - - - - 141
ORTHOGRAPHY QUESTIONS, - - - - - 162
ORTHOGRAPHY ANSWERS, - - - - 166
PHYSICAL GEOGRAPHY QUESTIONS, - - - 176
PHYSICAL GEOGRAPHY ANSWERS, - - - 184
READING QUESTIONS, - - - - - 206
READING ANSWERS, - - - - - 208
PHYSIOLOGY QUESTIONS, - - - - - 213
PHYSIOLOGY ANSWERS, - - - - - 219
WRITING QUESTIONS, - - - - - 240
WRITING ANSWERS, - - - - - 247
ARITHMETIC QUESTIONS, - - - - - 262
ARITHMETIC ANSWERS, - - - - 269
PHILOSOPHY QUESTIONS, - - - - - 279
PHILOSOPHY ANSWERS, - - - - 286
ASTRONOMY QUESTIONS, - - - - - 308
ASTRONOMY ANSWERS, - - - - - 315
BOTANY, - - - - - - 345

MODEL TEXT-BOOKS.

Chase and Stuart's Classical Series—Including all the Latin authors read in schools.

Hart's English Series—Including Language Lessons, Grammar, Composition, Rhetoric.

Houston's Series of Physics—Including Easy Lessons, Intermediate Lessons, Elements of Natural Philosophy, and Physical Geography.

Webb's Word-Book Series—Including Model Definer, Model Etymology, and Manual of Etymology.

Houston's Physical Geography—A text-book that will gladden the hearts of both teachers and pupils. Can be mastered in less time than any other text-book on the subject.

Hart's Composition and Rhetoric. The very general use of this book in schools of all grades is the best evidence of its merit.

Groesbeck's Practical Book-keeping. Can be taught by any teacher with but little study, even if he has not mastered the science of book-keeping.

JUST PUBLISHED: Intermediate Lessons in Natural Philosophy. By Prof. E. J. HOUSTON. This book is designed for the use of pupils who have finished any of the First Lessons in Natural Philosophy, but who are not sufficiently advanced to take up the larger text-books.

The Model Roll-Book, No. 1. This book is so ruled as to show at a glance the record of a class for three months, allowing five weeks to each month, with spacing for weekly, monthly and quarterly summary, and a blank space for remarks at the end of the quarter. Price, $1 50.

The Model Roll-Book, No. 2, is arranged on the same general plan as regards spacing, etc., excepting that each page is arranged for a month of five weeks; but, in addition, the names of the studies generally pursued in schools are printed immediately following the name of the pupil, making it more convenient when it is desirable to have a record of all the studies pursued by a pupil brought together in one place. Price, $1.50. ☞ *Specimen Sheets sent by Mail on Application.*

MANUALS FOR TEACHERS.

No. 1. The Cultivation of the Senses.....50 cts.
No. 2. The Cultivation of the Memory.....50 cts.
No. 3. On the Use of Words.....50 cts.
No. 4. On Discipline.....50 cts.
No. 5. On Class Teaching.....50 cts.

In preparation, ready in August, 1882:

Chase & Stuart's First Latin Book, Latin Grammar, Latin Reader, and Ovid.

THE TEACHER.—A monthly Educational Journal, devoted to the interests of Teachers, Schools, and the Cause of Education in general. Price, 50 cents per annum. Specimen copy sent free.

We shall be gratified to have teachers correspond with us. We offer some of the best of Modern Text Books, and shall be glad at any time to make liberal arrangements for the introduction of our books, or to exchange for others that do not give satisfaction. Send for catalogue. Please address

ELDREDGE & BRO.,

17 North Seventh Street, Philadelphia, Pa.

THE SCHOOL NEWS,

The *only newspaper* prepared expressly for use by the advance scholars in all Graded and Union Schools, Academies, Institutes, and Public and Private Schools of all kinds. It is issued monthly during the whole year. Each number contains a terse and complete summary of all the current news of the world during the previous month, **Secular, Political, Scientific,** and **Industrial.** It has the following special departments: Important Events; Science and Industry; Facts to Think About; Good Reading; Brilliants (selections for memorizing); Queer Queries; Political News, etc.

Its special aim is two fold: (1) To give the *important news* (current history) of the United States and the world, for the information and study of students about to become citizens; and (2) to furnish interesting *supplementary reading* to schools in a cheap serial form. Each number also contains a portrait of some distinguished man. Started in September, 1881, it is already being read by teachers and school clubs in every Western and Middle State, and has met with the enthusiastic approval of teachers, educators and students everywhere. "*Just what we want,*" is the constant comment.

Subscriptions can begin at any time. Teachers at Institutes can form large clubs at club rates.

Terms { **Single Copy, 35 cents a year.**
Clubs of 10 or more, 25 cents a year.

☞ ***10 Sample Copies sent free*** to any teacher wishing to make trial of same in school for purpose of getting up a club.

Address

HENRY D. STEVENS, *Editor,*
Indianaplis, Ind.

AMERICAN

Journal of Education

704 Chestnut Street, Saint Louis, Mo.

CIRCULATION OVER SIXTEEN THOUSAND COPIES.

Editions of the AMERICAN JOURNAL OF EDUCATION are now published

In ST. LOUIS for Missouri.
In CHICAGO for Illinois and Wisconsin.
In LEAVENWORTH for Kansas and Colorado.
In HOUSTON for Texas.
In COLUMBUS for Mississippi.
In LITTLE ROCK for Arkansas.
In NASHVILLE for Tenneessee.

This Journal reaches merchants and farmers, who are school directors, families, teachers, agents—more than 200,000 of the most *intelligent* and enterprising men and women in all sections of the country—who are not only able to *pay* for goods, but who become *permanent* customers.

Advertisers get the benefit of all this circulation, as advertisements go into ALL the editions. *Nine Editions* of the AMERICAN JOURNAL OF EDUCATION are now published for as many States. It has a larger circulation and reaches more intelligent and enterprising people than any similar publication in this country. Its several editions are read by more than 200,000 people.

Terms, $1.60 per annum, in advance. Address all communications to

AMERICAN JOURNAL OF EDUCATION,
704 Chestnut Street, St. Louis, Mo.

Graded Monthly Supplementary Reading

EASY LINES, 6 pp., illustrated. High first or low second Reader.

FRESH LEAVES, 6 pp., illustrated. High second or low third Reader.

YOUNG WIDE AWAKE, 12 pp., illustrated. High third or low fourth Reader.

THE SENSE-READER, 6 pp. High fourth or the fifth Reader.

They comprise, it is believed, the cheapest and most valuable series of language and reading lessons published.

They are literally a NEW DEPARTURE. Their special purpose is to make the boys and girls think when they read—to get pupils and teachers into a new line of work in reading and language.

These papers are not designed to take the place of reading books, but to be interspersed with the regular lessons. Although, where additional reading matter is desired before beginning the next reader, nothing better can be done than to procure a supply of these little papers of the proper grade.

TERMS.

	EASY LINES, FRESH LEAVES, or SENSE-READER, per year (10 months.)	With THE SCHOOLMASTER (20 Nos. Price $1.50)	Per Single Issue.
10 copies	$1.00	$2.10	10 cents.
20 "	1.50	2.50	15 "
30 "	1.75	2.75	20 "
40 "	2.00	3.00	25 "
100 "	5.00	6.00	60 "

"YOUNG WIDE AWAKE," being double size, any number of copies will cost just twice as much as the same number of "EASY LINES," etc.

In lots of forty or more the cost is only five cents ("Young Wide Awake" ten cents) per pupil for the whole year, thus furnishing more reading matter for five or ten cents than is contained in reading books of corresponding grades.

Subscriptions may begin with any month. We have only one price—that published above—so do not ask for special rate. Save your postal cards. Enclose three 3-cent. stamps for full set of specimen copies. Address

E. O. VAILE,

Oak Park, Ill.

"Will Double Your Power to Teach."

THE SCHOOL JOURNAL—Weekly, $2.00 per year, is a wonderful paper to benefit the teacher. It shows the teacher *how* to *teach*.

THE TEACHER'S INSTITUTE—Monthly, $1.00 per year, is like the SCHOOL JOURNAL, only it comes once a month. It is the widest circulated of any. If you have not seen it, you have missed a great deal.

FIRST TEACHING—Monthly, $1 00 per year, is devoted to Kindergarten and Primary Teaching. It is a gem; it is a mine of valuable knowledge.

THE SCHOLAR'S COMPANION—Monthly, 50c. per year, is just the paper you will want your pupils to read; INTERESTING, INSTRUCTIVE and EDUCATIVE.

E. L. KELLOGG & CO., 21 Park Place, New York.

THE NEW EDUCATION!

Its Principles and Methods in a New Journal,

THE PUBLIC SCHOOL,

Devoted solely to

The Theory and Practice of Teaching.

Monthly. Sixteen Pages. Thirty-two Columns.

Some of the Writers Engaged:

Hon. JOHN W. DICKINSON,
LARKIN DUNTON, LL.D.,
ANNA C. BRACKETT,
Col. FRANCIS W. PARKER,
ROBERT C. METCALF,
W. N. HAILMANN,
MARION TALBOT,
Prof. HERMANN B. BOISEN,
Rev. A. D. MAYO,
N. A. CALKINS, LL.D.,
Mrs. LOUISA P. HOPKINS,
Hon. JOHN D. PHILBRICK.

CORDIALLY ENDORSED

By Gen. John Eaton, LL.D., Com. Ed., Washington; Hon. N. A. Luce, State Sup't, Maine; Hon. J. W. Patterson, State Sup't, N. H.; Hon. John W. Dickinson, Sec'y Board of Ed., Mass.; Hon. Thomas B. Stockwell, Com. Public Schools, Rhode Island.

Hon. B. G. Northrop, LL.D., Sec'y Board of Ed., Conn.; Hon, J. L. M. Curry, LL.D., Agent Peabody Fund, Va.; and many other leading educators.

TERMS { Single Subscriptions, one year.....$1.00 each.
Five to Ten, " ..... .80 "
Ten or more, " ..... .75 "

SUBSCRIPTIONS RECEIVED AT ONCE.

Two Cents a Week will secure the knowledge of the Best Work and Most Advanced Methods.

Address

THOMAS W. BICKNELL, Manager,

16 Hawley Street, Boston.

OHIO EDUCATIONAL MONTHLY

AND

NATIONAL TEACHER.

Organ of the Ohio State Teachers' Association

And the oldest Educational Paper now published in this country. Its bound volumes constitute an important and valuable part of many a teacher's library.

$1.50 a year. Four or more copies at $1.35 each.

Address

SAMUEL FINDLEY,

Editor and Publisher,

AKRON, OHIO.

Teachers' Gift Cards. We are furnishing a series of elegant little Gift Cards for Teachers' presents. They are fine Bristol Cards, 2 by 4 inches in size, ornamented with a beautiful ribbon border and inscribed as follows:

"A Gift of Remembrance. To ..... Teacher."

They are put up in packages of 24 cards, each bearing a beautiful little embossed ornament or relief picture, each being different. They are really elegant, and Teachers who desire to present their pupils with a neat little gift, at a trifling cost, will find them to be just the thing. Price, per package of 24 cards, only 25 cents, or five packages for $1, postpaid. Address J. R. HOLCOMB & CO., Atwater Building, Cleveland, Ohio.

A NEW AND VALUABLE BOOK—KEY TO HARVEY'S GRAMMAR.

GRAMMAR MADE EASY.

This Key is a most valuable work, prepared by Thomas Eubank, a prominent Ohio Teacher and Institute worker. All of the sentences in Harvey's Grammar to be corrected, or corrected and parsed, are quoted in this work, reference being made to number and page. Each word is correctly parsed according to Harvey and other standard authors. The faulty sentences are corrected, the difficult parsings are fully explained, the exercises in punctuation are corrected, and the work of the teacher is made plain and easy. Nothing of the kind has been published before. It is just what thousands of teachers need to prompt them on technical points. It is indorsed by prominent educators, and is having an extensive sale. 112 pages. Paper covers. Price, 50 cents per copy. Price in flexible cloth covers, 65 cents. No sample copies free. Agents wanted. Send 50c. for outfit and terms to agents.

KEY TO HARVEY'S GRAMMAR.

We heartily commend this book to teachers, as it contains just what they have been wanting.—*John S. Royer, Co. Examiner, Ansonia, O.*

The "Key" is at hand. I consider it a valuable book.—*J. V. Hilliard, Co. Examiner, Croton, O.*

Hundreds of similar testimonials are on file in our office.

N. B.—We furnish Harvey's *Practical Grammar*, to which the above described work is a Key, for $1, postpaid. Address J. R. HOLCOMB & CO., Atwater Building, Cleveland, O.

THE TEACHER'S GUIDE.—A practical journal of education, indorsed by progressive teachers everywhere. Able contributors, lively discussions, and interesting notes and news. Published monthly. Price, 50 cents a year. *Sample copy free.* Address HOLCOMB & CO., Atwater Building, Cleveland, O.

MICHIGAN

Has a SCHOOL SYSTEM which is not surpassed in completeness and efficiency by that of any other State in the Union.

Her People are liberal and progressive; her University is the greatest in the West, and her New School Law a model.

These are advantages appreciated by experienced teachers.

TEACHERS

Wishing information about the educational interests of Michigan, will do well to subscribe for

THE SCHOOL MODERATOR

A weekly journal, published at

GRAND RAPIDS, MICH.

TERMS.....$2.00 per year.

WHAT EDUCATORS SAY ABOUT IT.

From V. B. Cochran, State Superintendent of Public Instruction.

It affords me great pleasure to express my appreciation of THE MICHIGAN SCHOOL MODERATOR, and to note the favorable reception which it is meeting at the hands of the teachers of our State.

From J. M. B. Sill, Superintendent Public Schools, Detroit.

I take pleasure in saying that I consider THE MODERTOR a very practical and valuable Educational Journal, well worthy of hearty support by teachers of the West.

From W. H. Payne, Professor of Pedagogies, State University.

I am glad you are meeting with success. You deserve it, and I hope it will come to you in large measure. You should have the moral and material support of all our teachers.

The following resolution was unanimously adopted by the State Teachers' Association at Lansing, December, 1881:

"*Resolved*, That the teachers of Michigan, now in convention assembled, most heartily endorse the school journal known as THE MICHIGAN SCHOOL MODERATOR, and that we do hereby extend our sympathy and earnest good will to the editors thereof for their efforts to give us a first-class school journal in our State."

Address

WALBRIDGE & EWING,

Newaygo, Mich.

TEACHERS.

With the unusual Educational progress that is being made [illegible] ere is a growing demand for good teachers. All who desire information to the schools in this State should subscribe for the

ARKANSAS SCHOOL JOURNAL.

only $1.00 a year. Specimen Copies, 10 Cts.

The Ohio Educational Monthly and the Arkansas School Journal, one year, $2.

WHAT PUBLISHERS SAY ABOUT IT:

"The Journal is a model of neat typographical art."—*Fredonia, N. Y., Censor.*

"The selection of topics seems to be most admirable."—L. S. Metcalf, Business Manager, *North American Review.*

"It is gotten up in fine style; no other exchange quite equals it in this regard."—*Indiana School Journal.*

"It is a fine specimen of printing. The Journal is ably edited, and in all respects it compares with the best of its class."—*New Albany Ledger Standard.*

"It is a model of neat printing and well edited matter."—*L. R. Gazette.*

"Just about the neatest and in every way the best gotten up pamphlet ever issued from the Southern press, is the Arkansas School Journal."—*Arkansas Republican.*

"It ought to be in every family. The Journal is a publication of which any State might boast."—*Arkansas Tribune.*

Address: KELLOGG PRINTING CO., Little Rock, Ark.

TEACHERS and STUDENTS

ATTENTION!

We will make you a present of a *free Library* of the best works of Science, Art, Literature, History, Travel, Biography, Fiction, or, in short any books published in the world, for getting up clubs for the

COMMON SCHOOL VISITOR,

the best *Students' Magazine* published. Price $1 a year. If you get but *one* subscriber, you will secure a valuable book. Send 10 cents to "The Visitor," Kirksville, Mo., for sample copy of the magazine, and catalogue of books to select from.

SEVEN NEW BOOKS

In preparation, and will be

Ready for Fall Term

1882.

DO NOT MAKE CHANGES UNTIL YOU HAVE SEEN THEM!

Chase & Stuart's First Latin Book.
" " **Latin Grammar.**
" " **Latin Reader.**
" " **Ovid,** with Lexicon and Notes.

A Manual of Elocution and Reading. By Dr. Edward Brooks, Principal of State Normal School, Millersville, Pa.

A Hand-book of Literature, English and American. By E. J. Trimble, Professor of Literature, State Normal School, West Chester, Pa.

First Lessons in Physiology and Hygiene. By Charles K. Mills, M. D.

We shall be gratified to have teachers correspond with us. We offer some of the best of Modern Text-books, and shall be glad at any time to make liberal arrangements for the introduction of our books, or to exchange for others that do not give satisfaction. ☞ SEND FOR OUR CATALOGUE. Please address

ELDREDGE & BRO.,
17 North Seventh Street, Philadelphia.

THE SCHOOL HERALD

A News-Manual for Use in Schools.

The SCHOOL HERALD was started in February, 1881, in the belief that the systematic study of a newspaper, free from the partisanship and trivial gossip so characteristic of the average journal of the day, would be of incalculable advantage in the education of the young. It was welcomed with enthusiasm, and is now in use in hundreds of schools in every State of the Union, besides being taken by thousands of teachers for their own especial benefit. Indeed, every teacher should take this paper, whether he is called to conduct a class in it or not, for the help it will be to him in his work to have so convenient a summary of passing history at his hand. Every student in Normal School, High School, or College, should subscribe for the same reason. The success of the paper proves its merit, both in conception and execution. It is a simplified and amplified compendium of Current History, furnishing at a merely nominal cost all the important news of the $10 dailies.

WHAT THEY SAY OF IT.

HON. JAMES P. SLADE, State Superintendent of Public Instruction, Springfield, Ill., says: "All teachers who attempt to teach current history, or to lead their pupils to study it, will find the SCHOOL HERALD invaluable."

REV. DAVID McCLURE, Ph. D., Principal of the California Military Academy, at Oakland, Cal., sending a club of 20, says: "The conception of your publication is excellent, and I believe it will prove very helpful with us in the direction for which it is proposed."

PROF. J. RUSSELL SOLEY, of the U. S. Naval Academy, Annapolis, Md., ordering the paper, with a binder, for his own use, says: "I hope your excellent undertaking may prove a success." Six months later, the Professor wrote his intention of using the HERALD in his classes, and the Academy sent an order for 71 subscriptions, with 71 binders.

J. H. FREEMAN, Superintendent of the Schools of West Aurora, Ill., sending a club of 29, in addition to 14 subscribers previously sent, says: "The SCHOOL HERALD deserves a hearty support from our schools. It is invaluable in the study of current history—a branch deserving a prominent position in the school curriculum. All of the West Aurora teachers have taken the HERALD from the first number. They vote it a signal success."

Terms: 75c. a year to single subscribers; in clubs of not less than 5 to separate address, 60c. each; to one personal address, 50c. each. *Specimen copies free.*

W. I. CHASE, 69 Dearborn St., Chicago, Ill.

UNIVERSITY OF ILLINOIS-URBANA
3 0112 112050239